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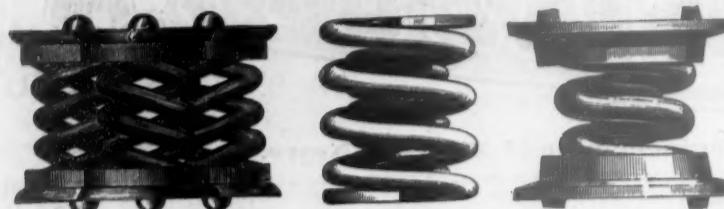
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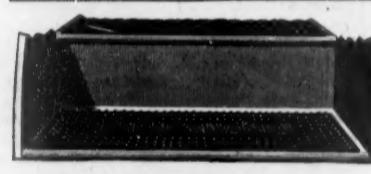
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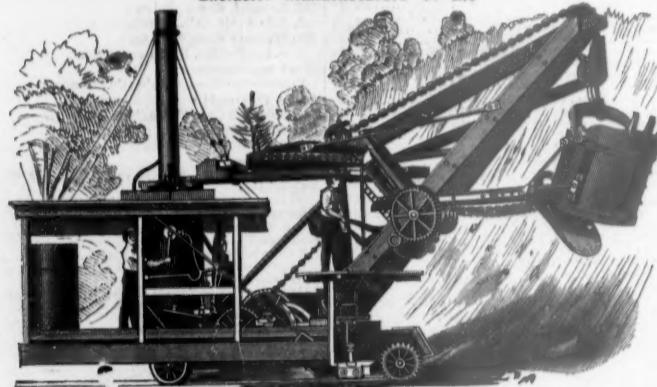
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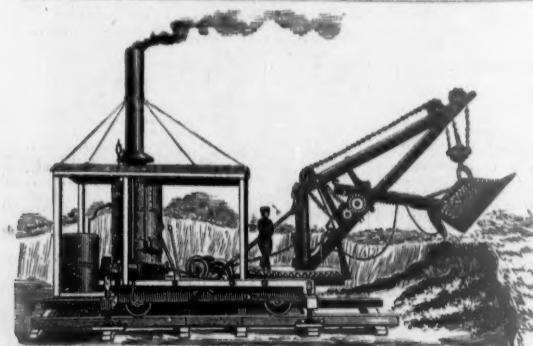


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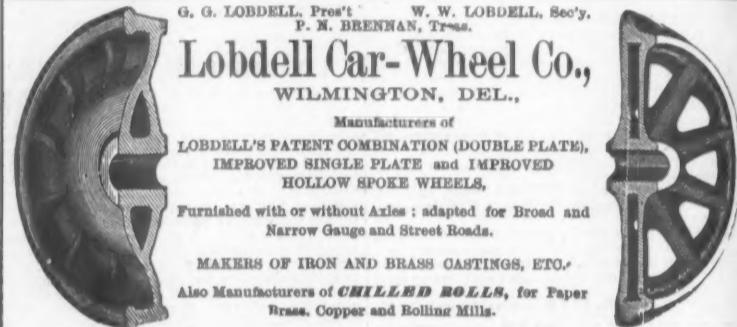


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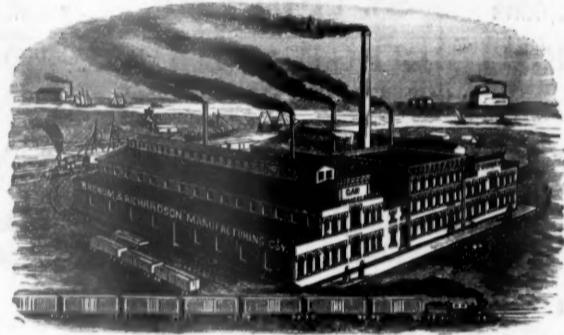
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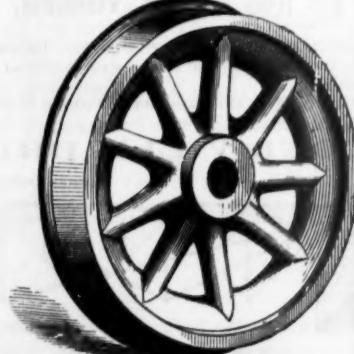
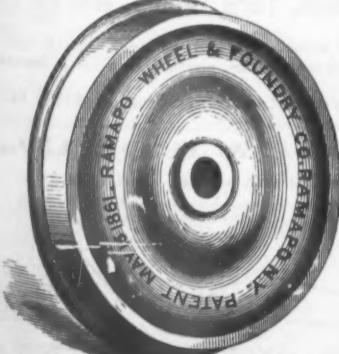
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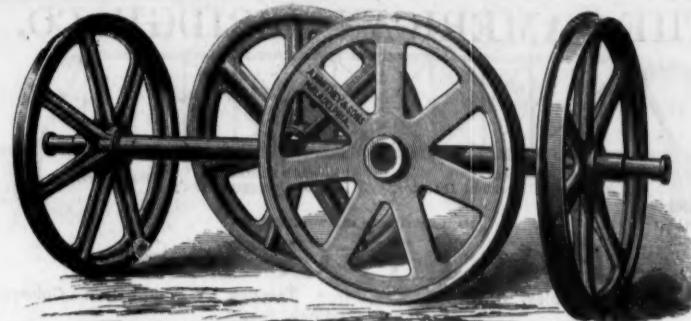
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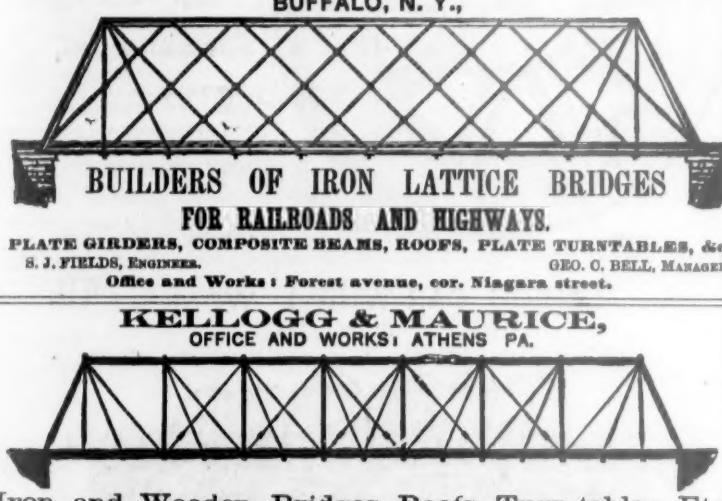
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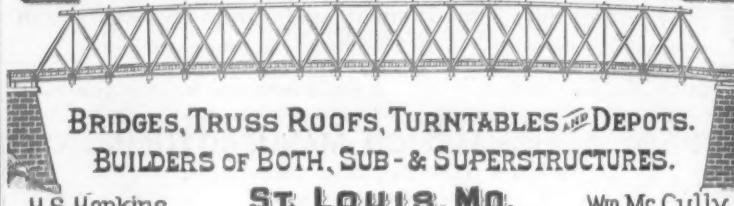
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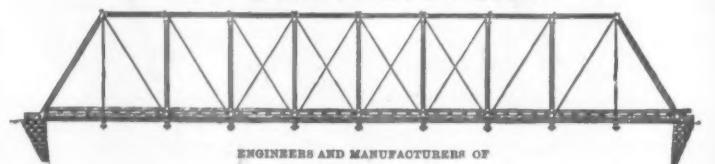
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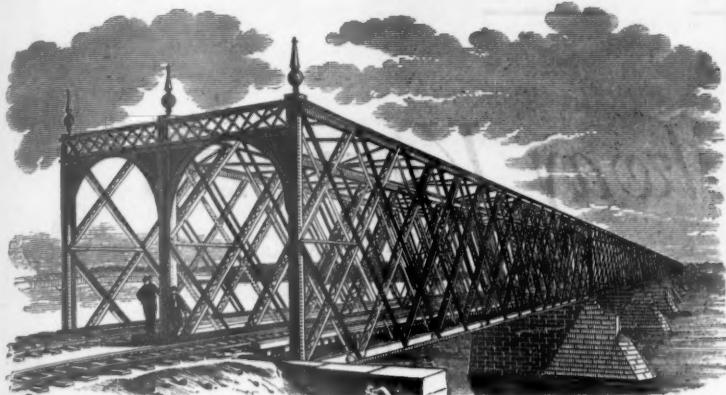
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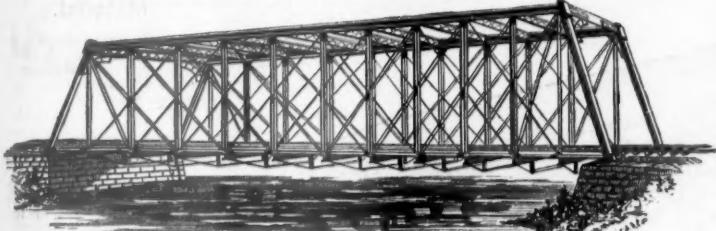
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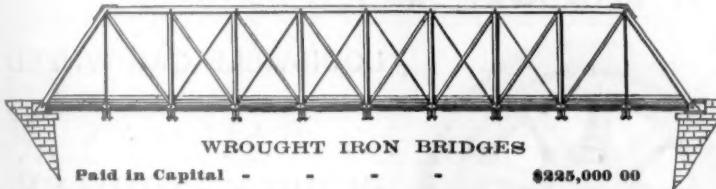
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This nut is represented in the engraving on the right, and is made of a conical form on the under side, and fits into the bolt hole which is made of the same shape. The cone and square portions are slotted so that when screwed up into the conical hole, the nut is compressed and clasps the bolt tightly, so that it cannot be shaken loose. The effect of wear is to make it fit the hole more accurately, so that when it is again tightened up it will be less liable to become loose than before it was worn. The conical nut is intended especially for fish plates and bolts. The engraving on the left represents a square nut cut apart on the top side only. The under side is made concave, so that in screwing it up the hole on the upper side is contracted and clasps the bolt in the same way as the conical nut. The square nut is intended for car work bridges and similar purposes.

The conical nuts are now extensively used in the track of the Philadelphia, Wilmington & Baltimore and Boston & Albany, and have been applied on a number of other railroads. It is simple in construction, being in one piece, has a longer bearing on the bolts than other nuts, and cannot strip the threads, and will always fit the bolts, no matter how loosely the thread is cut.

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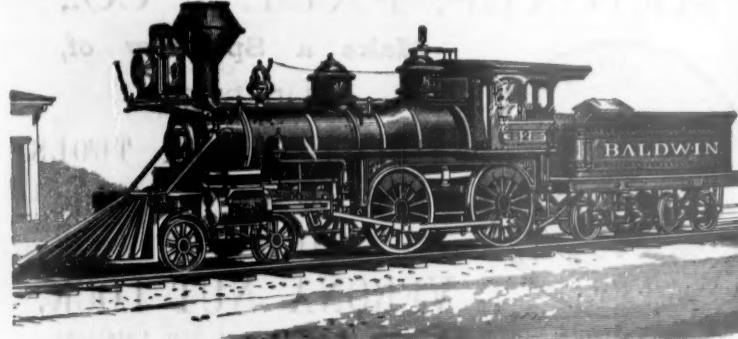
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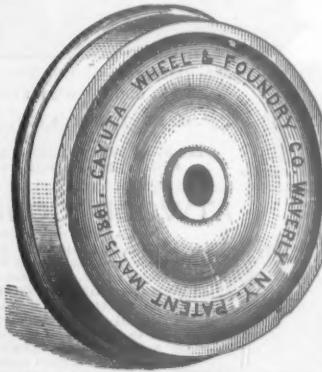
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FRIDAY, JANUARY 26, 1877.

Consolidation Locomotive Constructed at the Baldwin Locomotive Works.

This week we give the remaining engravings of this engine, a double-page view of which was published last week. We are indebted to *Engineering* for these engravings, excepting the detailed views of the truck, which have been made from original drawings furnished us by Mr. Ely, the Superintendent of Motive Power of the Pennsylvania road. The engines were built from designs furnished to the Baldwin Locomotive Works by that company.

In the *Railroad Gazette* of Dec. 1 of last year (page 519) we published engravings of an engine of the same type for the Lehigh Valley Railroad. In describing one illustrated this week and last, *Engineering* compares it with that represented in the *Railroad Gazette* of Dec. 1, as follows:

The engine made for the Pennsylvania Railroad is constructed for burning bituminous coal, whereas the engine for the Lehigh Valley Railroad, previously described, was arranged for burning anthracite. Thus a comparison of the two boilers will show that the one now illustrated has a smaller grate surface and fewer and larger tubes, the total heating surface being, however, very nearly the same in the two cases, it being 1,281 square feet for the Lehigh, and 1,258 square feet for the Pennsylvania engine. The cylinders of the two engines are the same size, namely, 20 in. and 24-in. stroke, while the coupled wheels are also practically the same size, the Lehigh engine having 50% in., and the Pennsylvania engine 50 in. wheels. We give below the proportions of the boiler of the engine now illustrated, and for convenience of comparison we annex similar data relating to the engine for the Lehigh Valley Railroad:

	"Consolidation" locomotive for Lehigh Valley Railroad; fuel, bituminous coal.	"Consolidation" locomotive for Pennsylvania Railroad; fuel, anthracite coal.
Ratio of fire-grate to heating surface ..	1 : 54.7	1 : 51.79
Ratio of fire-grate surface to area of fire-grate surface ..	1 : 5.87	1 : 6.87
Ratio of least sectional area of chimney to fire-grate surface ..	1 : 10.55	1 : 17.1
Ratio of fire-box surface to external tube service ..	1 : 12.67	1 : 10.1
Number of internal diameters in length of tubes ..	66	73.3

The chief dimensions of the boiler of the engine now under notice are given in the tabular statement on our two-page engraving, and it will be unnecessary, therefore, that we should repeat them here. We may, however, direct attention to some of the special constructive features. In the first place it will be noticed that the boiler instead of being of the "wagontopped" type—as it is called in the United States—like that of the engine for the Lehigh Valley line, has the fire-box casing considerably lower than the top of the barrel of the boiler, the top of the casing sloping away until at the rear end it is only about on a level with the centre line of the barrel. The crown of the fire-box also slopes downwards towards the rear, but less sharply than the top of the casing, and thus the fire-box crown and crown of the casing gradually approach each other, the distance between them being 10½ in. at the front, and but 3½ in. at the rear end. The crown of the fire-box and casing are stayed together in the same manner as the sides, there being no girder stays.

The impression conveyed by this arrangement of fire-box is that there is an insufficient space for proper circulation above the fire-box crown, and that the rush of the steam generated from this surface would be apt to cause priming. We have not, however, heard of any difficulty arising from this cause, and the fact that this form of fire-box and casing has now long been in use in America must, we suppose, be accepted as evidence that its performance is fairly satisfactory. It will be seen from our two-page engraving, and from the transverse section on the present page, that the gauge-glass fittings and gauge-cocks are mounted on a hollow column fixed on the top of the fire-box casing near the rear end, the top of this column being connected with the steam space of the boiler by a pipe, which is led up to the roof of the cab, and then passes down to join the tube through which the regulator rod passes, this tube being at its end inside the boiler a pipe which is led up to the top of the dome. The tube for the regulator rod has also at its rear end a drain pipe which passes down to the gauge-cock column. The whole arrangement is chiefly shown by our two-page engraving.

Although the engine is, as we have stated, designed for burning bituminous coal, it is, as will be seen, fitted with a water-tube grate similar to that employed for anthracite. The movable solid bars, provided for dropping the fire instead of being made to draw out, as in the case of the Lehigh Valley engine, are, however, in the engine now under notice cranked, as shown in our longitudinal section, and made to turn over

laterally on the crank centres. There are two of the solid bars in the width of the grate, and they are connected by a link at the rear end outside the fire-box, so that they can be moved together.

The boiler is provided with a large dome, and as in some of the other American locomotives we have described, the opening in the barrel is the full size of the dome, and is strengthened by flanging the barrel plate outwards, as shown. The top of the dome is of cast iron, as is usual in American practice. It will be noticed that the ring of the barrel on which the dome is placed is made taper, its underside sloping downwards to join the fire-box casing. This gives it an oval form in cross-section, and necessitates the introduction of transverse stays, these being placed just above the tubes, as shown. The smoke-box tube-plate is strengthened by two diagonal stays, not shown in our engraving. The feed enters the boiler at the sides of the barrel near the front end, and passes into a transverse pipe or chamber of rectangular section situated just above the tubes, this chamber having distributing pipes led off from it towards the rear, as shown in

what may be called the standard features of American locomotive practice.

The springs of the three hind pairs of wheels are connected by compensating levers, while those of the front pair of coupled wheels are similarly connected to the pony truck at the leading end. This truck is of the swing-beam type, instead of being a Bissell truck, as in the Lehigh Valley engine, and its construction is shown by the longitudinal section and by the transverse section. From these views it will be seen that a strong transverse stay between the frames carries a casting in which a hollow plunger slides, this plunger having an opening at one side through which the end of the compensating beam passes. As will be seen from the views above referred to, the end of the compensating beam takes hold of a stirrup at the bottom of a link hanging from the top of the plunger, this link being provided with adjusting nuts, as shown. The lower end of the plunger bears upon a kind of bridge-piece, which spans—but is clear of—the transverse bar connecting the axle-boxes of the truck, this bridge being coupled to the centre of a pair of transverse springs, as shown. The ends of the springs just mentioned are coupled by pendent links to the bar which connects the axle-boxes, and the latter are thus left free to move laterally. Radius bars from the bottom of the axle-boxes, and from the transverse bar which connects these boxes, are led back to centres just in front of the first pair of coupled wheels, as shown in the longitudinal section.

The coupled wheels of the engine under notice are of cast iron, with crucible cast-steel tires, the tires of the two middle pairs of wheels being without flanges and 6½ in. wide. The wheels have hollow spokes, and the section of the rim is shown by the transverse section, Fig. 2. The truck is provided with Messrs. A. Whitney & Sons double-plate chilled wheels.

The type of engine we have been describing does some very heavy work on the Pennsylvania Railroad. Thus, on the Philadelphia & Columbia Division, where the maximum grade going eastward is 40 ft. to the mile, or 1 in 132, the load, taken at a speed of 15 miles per hour consists of a train of 35 loaded cars weighing 735 tons, exclusive of the engine; while going westward over the same division, a maximum grade of 49 ft. per mile, or 1 in 107.8 to be surmounted, and the load is then 30 loaded cars weighing 630 tons. The consumption of fuel on this part of the road averages 4.2 lbs. per mile per car hauled. On the Columbia & Harrisburg Division there is a short grade of 30 ft. per mile, or 1 in 176 going eastward, and a short grade of 37 ft. per mile or 1 in 142.7 going westward, and on this section the loads in the two directions are 70 cars weighing 1,470 tons, and 65 cars weighing 1,365 tons respectively, the consumption of fuel averaging 2.7 lbs. per car per mile. On the Erie & Langdon's Division the maximum gradient going eastward is 71 feet per mile, or 1 in 74.4, and up this gradient the engines haul 24 loaded cars weighing 504 tons. On the Renovo & Jersey Shore section going eastward there is a gradient of 26 ft. per mile, or 1 in 203, for about 4 miles, the remainder of the line being practically level, and on this division the load for the engines consists of 80 loaded cars weighing 1,680 tons, with a consumption of 2.7 lbs. per car per mile. Finally, on the Susquehanna Division, which is about level, the load going eastward consists of 85 loaded cars weighing 1,785 tons, this load being frequently taken at a speed of 25 miles per hour, and the fuel consumption being 2.5 lbs. per car per mile. These performances are of much interest, the loads being unlike anything hauled in this country.

The Ashtabula Accident.

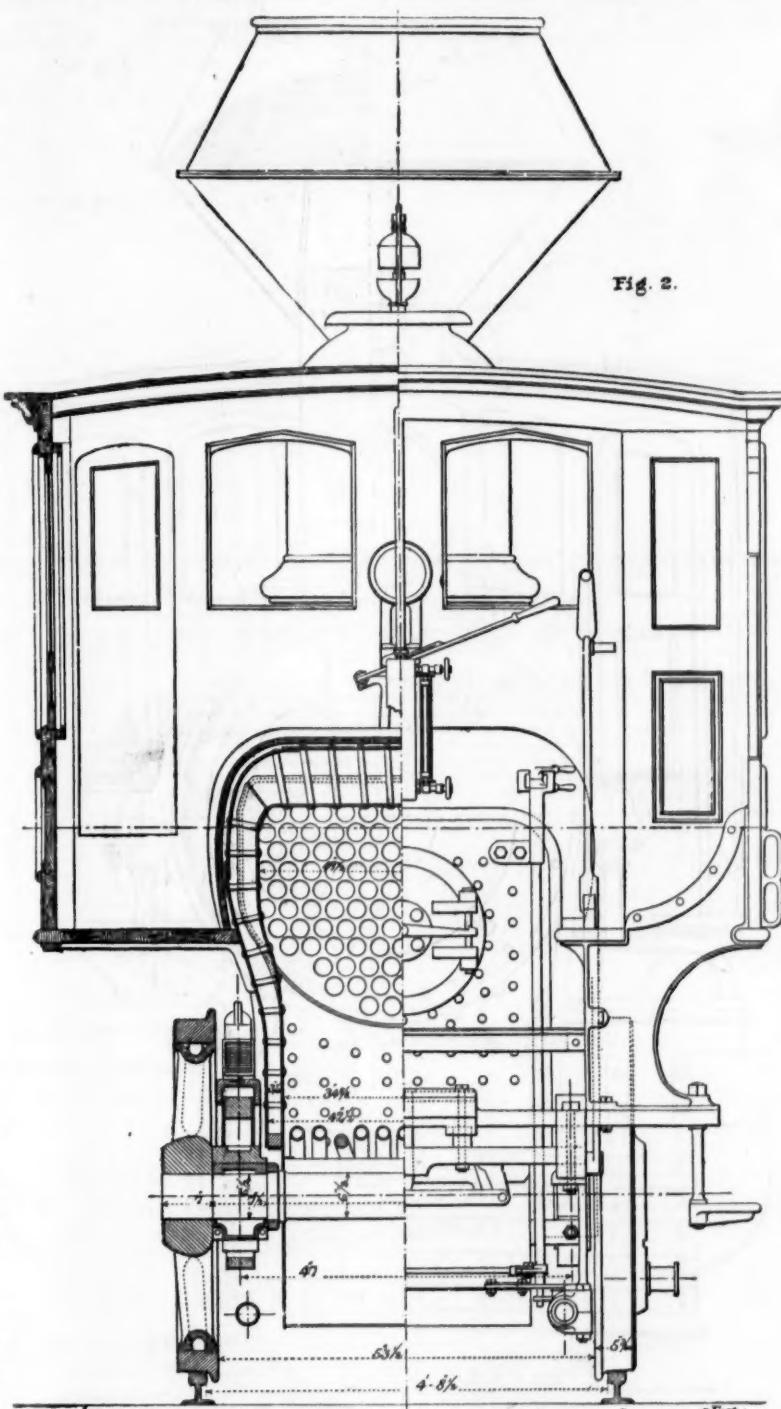
The investigation of the causes of this accident by the committee of the Ohio Legislature was begun last week, and meanwhile the coroner's inquest has continued. The following is a report of the examination of Mr. Amasa Stone, President of the Lake Shore Company when the bridge was built, before the Committee of the Legislature:

Mr. Stone being in delicate health, the committee met at his residence, on Euclid avenue. Being sworn, he testified as follows: He was at first Superintendent of the Lake Shore road, from Cleveland to Erie, for two years, and was afterward President from 1856 to 1867, and has since been a director of the road. The bridge across Ashtabula Creek was built in 1868; witness designed the bridge, but only superintended the drawing of the plan, while the details of construction were given into the hands of Mr. Albert Congdon, who was supervised to Mr. Joseph Tomlinson; the witness has not now the original plan of the structure, and does not certainly know where it may be found.

Q.—Were there full written specifications of the bridge at the time of its construction, and if so, where are they now? A.—There were all the specifications usually given, but I do not know where they now are.

Q.—Were there full specifications at the time? A.—There were.

Q.—Were the other papers preserved till the bridge was completed? A.—I am not aware that they were. The span of the bridge was 154 feet; the width of the bridge, from outside to outside, was 19 feet 6 inches, perhaps 20 feet; the width of the bridge between the chords, 14 or 14½ feet; the width of the truss was 19 feet 6 inches, and 20 feet in height from the lower edge to the upper edge; the width of each panel was 11 feet; there were four in all; there was no change in the plan of the works as projected by witness; there was no departure from the original plan as to strength, &c.; there was an error which gave the builders some trouble; this error was that they put in some parts horizontally that should have gone in vertically; the lugs may have been chipped off in remedying the mistake; the witness does not remember as to that point; the original design of the braces was not to be six inches flange, six inches web; it was to be seven inches in both cases. The lugs upon the brace-block do not show, so far as I know, that they should be six inches; I was advised that the work was going on very slowly,



CONSOLIDATION LOCOMOTIVE AT THE PHILADELPHIA EXHIBITION.

Built at the Baldwin Locomotive Works, Philadelphia.

and I went down to see what the trouble was. I heard of no trouble after the change from horizontal to vertical was made; Mr. Tomlinson was intrusted with the construction of the bridge in the beginning, but he was found very inefficient, and he was discharged, and Mr. Rogers was put in his place; Mr. Rogers had no experience either before or since in the erection of iron bridges, so far as the witness knows. There could have been no other mistake made than the one that was made. The weight and pressure of the bridge, bound by the vertical truss-rods, would hold it in place. The unscrewing of the rods from the bearings would loosen them; the dropping out of three or four counter braces would not affect the strength; one-half of them out of place would not affect the strength; at the centre the counters become main braces, but at either end they are not so important; the dropping out of a few at the centre would injure its strength; no other means was devised to keep the counters in their places, because the lugs were placed on almost entirely for convenience in raising; they were for no especial purpose after the bridge was raised; the braces were held by other means; there would be no means of elongating the tie-rods sufficiently to injure the strength of the bridge; the struts upon the lower part of the bridge were 22 feet, perhaps, I don't recollect.

The bridge would be a very safe one without any lateral braces, it is so very thick. Witness has known bridges erected without any lateral braces to stand for years. There were in the bridge various iron cross-ties, fastened to the upper chords of the bridge by loop bolts, upon which the rails were laid. The resting of the iron rails upon the top chord in the center of the panels would not weaken the upper chord; it is usual to have those beams thus rest; it is not usual to strengthen the top chords for this purpose, for they are supposed to be strong enough; the bridge must be twice as strong to carry two tracks as to carry one track in the center; I have carefully considered the matter, and my conclusion is that the dead weight of the bridge and its load would not strain the bridge more than 8,000 or 9,000 pounds to the square inch, while it was capable of supporting 32,000 pounds to the square inch; one train on one side of the bridge would strain the trusses about 85 per cent. as much as it would were two trains passing over at the same time; when the bridge broke, it swung to the north, while the load was pitched to the south; it is very conclusive evidence to my mind that the bridge was carried down by the second locomotive leaving the track in some way; the bridge was not strong enough to carry a train across off the track; had the bridge broken of its own weakness it would have swung to the south; a model tested to the extent of breaking a truss would show that that truss would break to the south and carry the bridge to the south; an engine dropping on the cross floor beams would tend to deflect them, and pull the truss which the train was passing over on to the north, and when pulled to the north it would then go down; the braces were fastened together in the center by loop bolts, which kept them all in position; this bridge would have been stronger if the tie-rods had been perpendicular and the braces oblique; I have never constructed any other Howe truss bridge with wrought-iron braces, and know of no other anywhere in the country; when Mr. Rogers made the mistake in putting in the braces it was not negligence in permitting him to continue the superintendence of the erection of the bridge, for there was no other particular in which he could have made a mistake; it was not even unwise to permit him to continue; the directions of the witness were that the ends of the sway rods be enlarged so as not to be weakened by the cutting of the thread upon them; if this was not done, and the thread did actually reduce the strength of the rods, it was a poor job; when the bridge was changed, in correcting the mistakes there were no more braces inserted, no parts of the bridge were reduced in size because the rollers in the shop were not sufficient in size; witness had no interest in the mill where the iron was made; his brother, A. B. Stone, the Chisholms, and Mr. Jones, owned it at that time.

Q.—Ought not such bridges as the one under consideration to be examined by an experienced bridge-man as often as once in three months, and by the trackmen quite frequently? A.—There would be no necessity of tightening and loosening the nuts on account of the changes of the temperature, as the nuts are practically tight in warm or cold weather; the examination should be for the purpose of seeing whether the nuts had become loosened or any of them were off; the wrecked train and the passengers were burned up from fire kindled by the locomotive or stoves in the cars, probably by the latter.

Q.—Why did not your company comply with the law in regard to safety from fire in case of accident? A.—I examined the stoves called safety stoves, and consider them more dangerous than those now in use.

Q.—Why did you not use steam for heating? A.—It is not practicable. No engine can furnish enough steam for its regular work and to heat the cars also; the work of braking with steam comes when the train is slackening up, and the steam for running the train is not in use. While the bridge was going up the witness gave no personal supervision to the work; the ironwork was done by as thorough a master machinist as the witness knows of; witness was at the shops afterward while the bridge was being built; he was at the bridge only once during its erection; that was when there was a report that there was trouble in putting it up. When the bridge was tested it was stiffer and the deflection was less than expected; the difference in cost between the bridge built and stone arches would have been about \$18,000; the bridge itself cost about \$15,000; the bridge and arches cost perhaps nearly \$75,000.

TESTIMONY OF MR. CHARLES COLLINS, CHIEF ENGINEER.

Mr. Charles Collins gave the following testimony before the same committee:

I do not know where the original plans of the bridge are, unless they are at Ashtabula, before the Coroner's jury; they are the full working plans; I never saw them, however; such plans are generally preserved; they belonged to my office, but at

about the time the bridge was constructed I was put on other work, and this was put into the hands of another man; I never saw the plans, therefore, as they were not sent to my office; I think they were up at the shop when the work was done; they would also be wanted when the bridge was set up; the examination of the bridge belongs to men under me; my instructions are to report everything wrong; G. M. Reed is at the head of the examining corps; he has no set time, but works on a general order; some time in September he reported verbally that the bridge was all right; they have not been required to report in writing in ordinary business; I never made any statements to the effect that "the bridge was not mine but Stone's;" I was once staying at Ashtabula, and Mr. Rogers asked me to go and visit the bridge, and I told him the braces were in wrong, but that I had nothing to do with it; he requested me to have Mr. Stone come down; I went with Mr. Stone who remarked that he was surprised the braces were in wrong; it was still resting on the trestle-work; when I saw it next it was tested; the braces were afterward turned and an

blocks; since the accident I have been too busy in the erection of a new bridge to examine as carefully as I desired the material of the wreck; if one or more of the sway rods were to break, the floor would go one way, the train the other; the application of air brakes would check the train and possibly jump a car from the track.

TESTIMONY OF THE MASTER MECHANIC.

Mr. Alfred Congdon, of Elyria, who was Master Mechanic of the Lake Shore road when this bridge was built, gave testimony, which is reported as follows:

That the bridge was intended for a double track when built, but was not used as such for some time; that after the bridge was completed, the supports being removed, it was found that the middle portion sagged so much that it was necessary to put in new braces and change the beams. Witness always thought that there should have been an additional cord under the bridge, but says that, as the bridge was, it was perfectly safe if it had received proper attention. He believed the stirrups which had been put into it to strengthen the braces and rods had worked out, and this could not have occurred without detection had the bridge been inspected at proper intervals.

Fig. 3.

British Railroads in 1875.

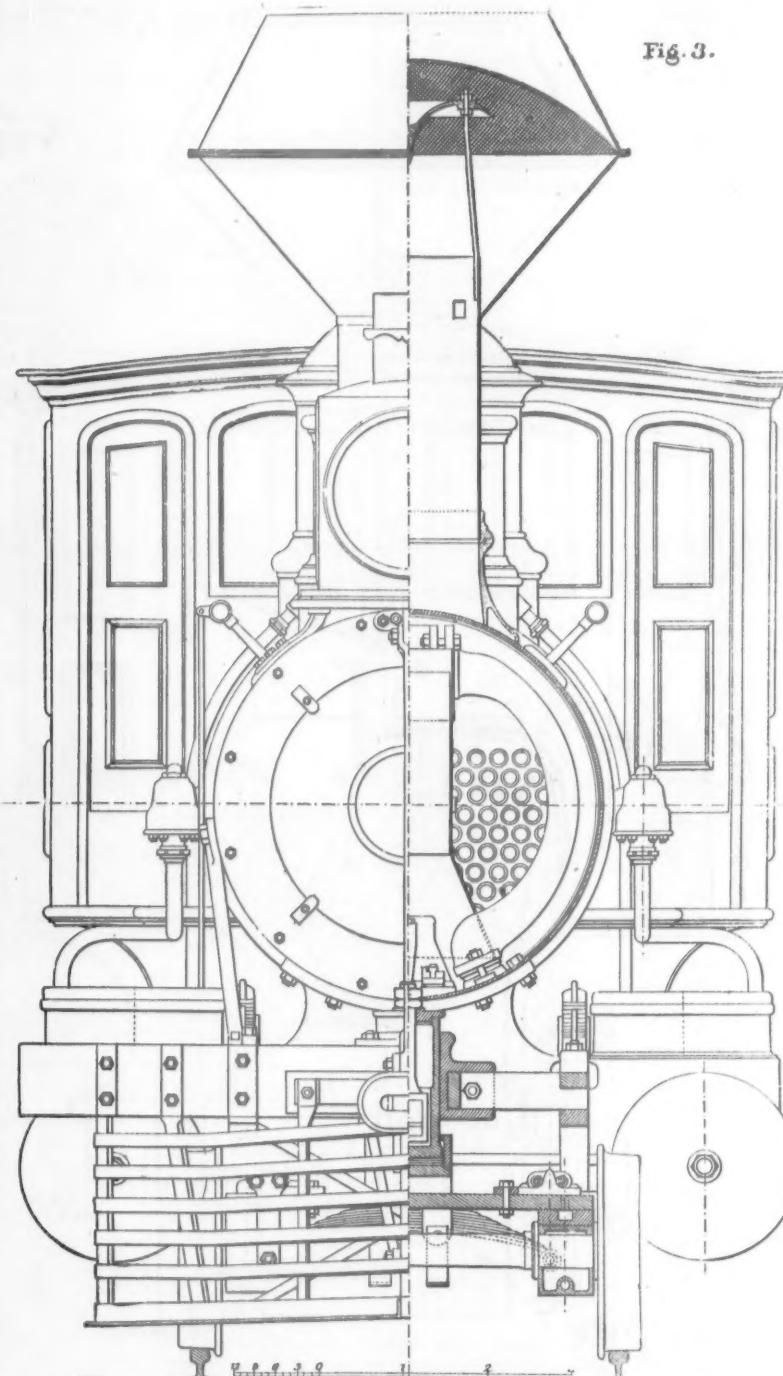
The following is the report of Capt. H. W. Tyler, Chief Inspector of the British Board of Trade, on the share and loan capital, traffic, working expenditure and net profits of the railroads of the United Kingdom in 1875:

RAILWAY EXTENSION.

The total length of railway open for traffic on 31st December, 1875, was 18,688 miles, of which 8,898 miles were laid with two or more lines, and 7,780 miles with a single line of rails. They were distributed as follows: In England, 11,789 miles, including 4,460 miles of single line; in Scotland, 2,721 miles, including 1,661 miles of single line; in Ireland, 2,148 miles, including 1,639 miles of single line. There was an increase of 209 miles between 31st December, 1874, and 31st December, 1875—namely, from 16,449 miles to 16,658 miles, or at the rate of 1.27 per cent. This increase was made up as follows: From 11,622 miles to 11,789 miles, or 1.44 per cent. in England; from 2,704 miles to 2,721 miles, or .78 per cent. in Scotland; and from 2,127 miles to 2,148 miles, or .90 per cent., in Ireland. But much has still to be done. While the length of new lines opened for traffic during the six years, 1870 to 1875 inclusive, amounted to 1,813 miles, application has been made to Parliament in the last seven years in regard to 6,080 miles; and Parliament has sanctioned during the same period the construction of 2,500 miles, all of which will, no doubt, sooner or later, be completed. Additional lines are being laid down on the busiest portions of existing railways, which are also being otherwise improved; some of the lines which have been partly constructed and temporarily abandoned will be recommended; and new or widened lines become, as traffic continually increases, more and more necessary for separating, on through routes, the fast and the slow traffic from one another.

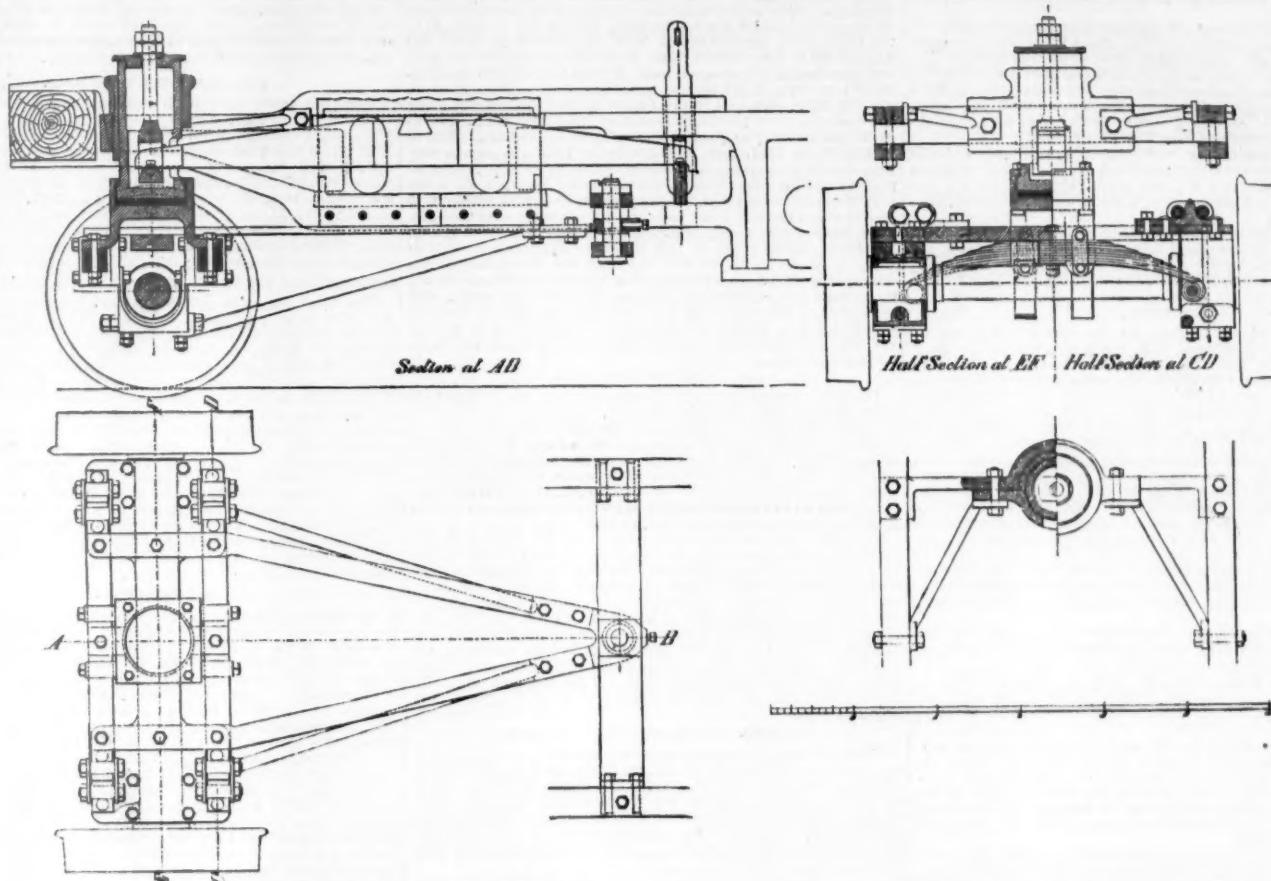
CAPITAL.

The total capital raised by shares, stocks and loans on 31st December in each of the years from 1871 to 1875 inclusive was as follows: 1871, £552,661,551; 1872, £560,047,346; 1873, £588,320,308; 1874, £600,895,931; 1875, £630,223,494; showing an increase of £20,527,563 during 1875. The average cost per mile of railway open, which was £34,094 at the end of 1868, had increased to £34,106 at the end of 1870, to £35,944 at the end of 1871, to £35,984 at the end of 1872, to £36,574 at the end of 1873, to £37,078 at the end of 1874, and to £37,893 at the end of 1875. The more recent railways have, with the exception of the Metropolitan and some others, been constructed at a much lower rate of cost per mile than the above figures of rather more than £34,000 for 1858 to nearly £38,000 for 1875. But the rate of cost on the total mileage continually increases in consequence of the constant necessity for laying down additional lines and sidings, and improving the accommodation in goods and stations, and otherwise providing for working safely and economically the ever-increasing traffic on the older lines. And the same result must be expected from year to year as long as the traffic of the country continues to increase in the same ratio. But the capital has thus increased in very different proportions as regards the various descriptions of stocks and loans. The increase in ordinary shares for the year 1871 over the year 1870 was rather under a million, or only .42 per cent.; for the year 1872 over the year 1871 nearly 9 million, or 18.7 per cent.; for the year 1873 nearly 5% million, or 2.26 per cent.; for the year 1874 rather over 4 millions, or 1.67 per cent., and for the year 1875 rather more than 6 millions—viz., from £248,528,241 to £254,600,731, or 2.4 per cent. The increase in guaranteed and preference stocks or shares was from £173,051,875 at the end of 1871, to £177,764,674, or 2.7 per cent., at the end of 1872; to £188,117,069, or 5.8 per cent., at the end of 1873; to £200,930,629, or 6.8 per cent., at the end of 1874; to £212,193,324, or 5.6 per cent., at the end of 1875. The increase also in loans and debenture stocks was from £149,378,080 in 1871 to £152,205,728, or 1.9 per cent. in 1872; to £155,749,494, or 2.2 per cent. in 1873; to £160,437,061, or 3.01 per cent., in 1874; and to £153,429,438, or 1.91 per cent., in 1875. But the debenture stocks increased at the rate of 28 per cent. in 1872, 16 per cent. in 1873, and 11 per cent. in each of the years 1874 and 1875—viz., from £57,202,355 in 1871 to £85,984,511 in 1872, to £99,855,120 in 1873, to £111,170,991 in 1874, and to £123,008,684 in 1875; while the terminable loans decreased at the rate of 19 per cent. in 1872, 16 per cent. in 1873, 12 per cent. in 1874, and 18 per cent. in 1875—viz., from £82,095,545 in 1871 to £66,224,217 in 1872, to £55,888,514 in 1873, to £49,266,070 in 1874, and to £40,420,754 in 1875. The process of converting terminable debentures into debenture stocks, which was proved some years since to be so necessary, has thus been further continued.



CONSOLIDATION LOCOMOTIVE AT THE PHILADELPHIA EXHIBITION.

Built at the Baldwin Locomotive Works, Philadelphia.



SINGLE-AXLE TRUCK OF CONSOLIDATION LOCOMOTIVE FOR THE PENNSYLVANIA RAILROAD.

The percentage of loans to the total capital has decreased from 15 per cent. in 1871 to 9 per cent. in 1873, to 8 per cent. in 1874 and to 6 per cent. in 1875; while the percentage of debenture stocks has increased from 12 per cent. in 1871 to 15 per cent. in 1872, to 17 per cent. in 1873, to 18 per cent. in 1874 and to 20 per cent. in 1875. The proportion of ordinary capital remained at 42 per cent. of the total capital for each of the three years 1871, 1872, 1873, but decreased to 41 per cent. in 1874, and to 40 per cent. in 1875; the proportion of debenture stock and loan capital taken together, which was 27 per cent. of the total capital for the years 1871 and 1872, has decreased for the years 1873, 1874 and 1875 to 26 per cent.; and the proportion of guaranteed and preference stock, which was at 31 per cent. for the years 1871 and 1872, increased for the year 1873 to 32 per cent., for the year 1874 to 33 per cent., and for the year 1875 to 34 per cent. of the total capital.

During the year 1875 of the capital of those companies whose lines were open for traffic no interest was paid upon £7,667,081 of preference stock, apparently from a want of sufficient profit in working; this was a falling off as compared with 1874, in which year the proprietors of £7,326,169 of preference stock received no dividend. The holders of £48,000 of loans and of £769,464 of debenture stock were also without interest in 1875. This, too, was a falling off as compared with 1874, both as regards loans and debenture stock. In that year the holders of £8,000 of loans and £514,674 of debenture stock were without interest. No interest was paid upon £35,678,393 of ordinary stock in 1875, which was an improvement as compared with 1874. In that year the proprietors of £41,121,014 of ordinary stock received no interest. But the difference, as I have pointed out in previous reports, between the nominal value of many of these stocks and loans and the amounts actually received by the companies for them, is, in consequence of the mode in which the money has been raised, very considerable.

RATES OF INTEREST.

The average rate of interest paid on ordinary capital in 1875 was 4.72 per cent., against 4.49 per cent. for 1874, 4.39 per cent. for 1873, 5.14 per cent. for 1872, and 5.07 per cent. for 1871, showing an increase for 1875 of .23 per cent. over 1874, but a decrease of .27 per cent. below 1873, of .42 per cent. below 1872, and of .35 per cent. below 1871; while on guaranteed, preferential and loan capital the average interest paid was 4.42 per cent. for 1875, against 4.41 per cent. for 1874, 4.39 per cent. for each of the years 1873 and 1872, 4.42 per cent. for 1871, and 4.48 for 1870. The average interest on debenture loans decreased from 4.37 per cent. in 1870 to 4.25 per cent. in 1871, and to 4.19 per cent. in 1872, from which rate it has varied but little, being 4.21 per cent. in 1873, 4.20 per cent. in 1874, and 4.18 per cent. in 1875; and that on debenture stock decreased from 4.47 per cent. in 1870 to 4.37 per cent. in 1871, to 4.31 per cent. in 1872, to 4.33 per cent. in 1873, to 4.32 per cent. in 1874, and to 4.28 per cent. in 1875. The 4.54 per cent. of interest paid on £158,692,064 of guaranteed and preference stock in 1870 decreased continuously to 4.51 per cent. on £173,049,413 in 1871, to 4.49 per cent. on £177,764,674 for 1872, and to 4.48 per cent. on £181,127,069 for 1873, but rose to 4.52 per cent. on £200,930,629 in 1874, and to 4.54 per cent. on £213,193,324 in 1875.

The average net earnings on the total capital increased from 3.75 per cent. for 1858 to 4.19 per cent. for 1870, to 4.43 per cent. for 1871, and to 4.51 per cent. for 1872, but decreased to 4.36 per cent. for 1873, and to 4.44 per cent. for 1874, and again increased to 4.25 per cent. for 1875; while the average interest on pre-

ferential and loan capital taken together decreased from 4.68 per cent. for 1858 to 4.48 per cent. for 1870, to 4.42 per cent. for 1871, and to 4.39 per cent. for both 1872 and 1873, but improved to 4.41 per cent. for 1874, and to 4.42 per cent. for 1875.

The above facts are interesting, as showing at a glance the net results of railway working in the United Kingdom for the five years. It will be observed that the rate of interest on the total capital expended slightly exceeded the interest on the loans, debenture stock and preferential capital taken together, the former being 4.54 per cent. and the latter 4.42 per cent. for 1875; while the rate of interest on the ordinary share capital which (including the portion on which no dividend was paid)

averaged 4.72 per cent., exceeded the fixed interest on stocks and loans preferred to it, which (including also those which received no cash payment) averaged 4.42 per cent.

PROPORTIONS OF CAPITAL IN RELATION TO RATES (OR ABSENCE) OF INTEREST.

Of the ordinary share capital, amounting to over 254½ millions, nearly 38½ millions, as above stated, or 5½ millions less than in the previous year, received no dividend at all.

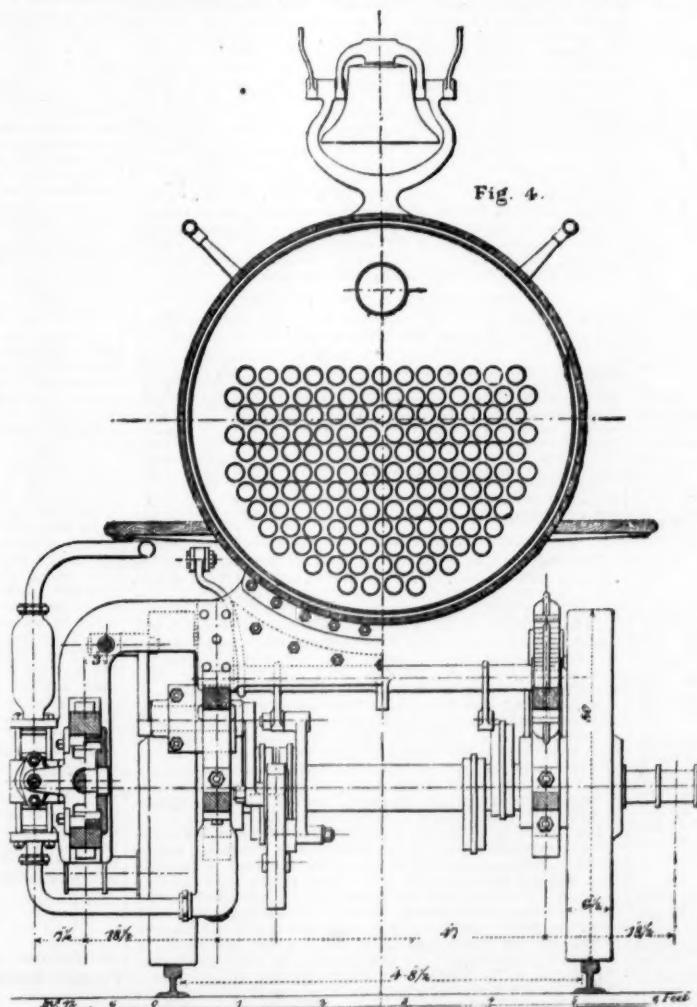
Of the remaining 216 millions, in round numbers, 9 millions received dividends of less than 1 per cent., 3 millions from 1 to a fraction under 2 per cent., 11 millions from 2 to a fraction under 3 per cent., 14 millions from 3 to a fraction under 4 per cent., 31 millions from 4 to a fraction under 5 per cent., 28 millions from 5 to a fraction under 6 per cent., 43 millions 6 per cent., 9 millions 6½ per cent., 39 millions 6¾ per cent., 4 millions from 7 to a fraction under 8 per cent., 20 millions from 8 to a fraction under 9 per cent., 1 million from 9 to a fraction under 10 per cent., 4 millions from 10 to 12 per cent.

There is, however, included in the above a large amount of capital of companies whose lines are under lease, or of capital which receives fixed rates of interest. Although this amount was subscribed, and has been returned as ordinary capital of companies whose lines are thus leased, it might perhaps more properly be considered as guaranteed capital of the leasing companies. The rates of interest on this amount are not, however, generally high, excepting in one case, in which nearly 2½ millions received 11½ per cent. of interest.

Of the 38½ millions of ordinary share capital on which no dividend was paid, 32½ millions belonged to English companies, 3 millions to Scotch companies and 3 millions to Irish companies. The total ordinary capital at the end of 1875 of the English companies was nearly 214 millions, of the Scotch companies about 24½ millions, and of the Irish companies about 16 millions.

The average dividend on the 254½ millions of ordinary share capital, computed from the rates returned as having been paid on 216 millions, and considered to be spread over the whole, amounted, as already stated, to 4.72 per cent.; while the average amount of dividend or interest, computed from the rates returned as having been paid on £583,164,549 but spread over the whole of the share and loan capital—namely, £630,223,494, amounted to 4.64 per cent. This last percentage may, as stated in former reports under similar circumstances, appear at first sight to clash with the percentage of net receipts to total share and loan capital given in Table No. 2, column 7, and quoted under the last heading, as only 4.25 per cent. It is necessary, therefore, again to explain that the difference arises, partly in consequence of the subscriptions by certain companies to the undertakings of other companies being credited to the capital of the company subscribed as well as to the capital of the company subscribed to, but mainly to the exclusion from the calculations on which column 7 of Table 2 is based, of the receipts and expenditures on account of navigations, harbors, canals, steamboats, &c. These latter are, of course, included in Table No. 3, as regards both the capital outlay and the proportionate rates of interest paid on the different descriptions of capital raised for railway and other purposes.

The capital returned as guaranteed, amounting to nearly 78 millions—2½ millions received dividends of 2½ or less per cent.; 1½ millions from 3 to a fraction under 4 per cent.; 15½ millions from 4 to a fraction under 4½ per cent.; 12 millions from 4½ to a fraction under 5 per cent.; 35½ millions of 5 per cent.; 2 millions from 5½ to a fraction under 6 per cent.; 5½ millions of 6 per cent.; 1½ millions from



CONSOLIDATION LOCOMOTIVE AT THE PHILADELPHIA EXHIBITION.

Built at the Baldwin Locomotive Works.

6% to a fraction under 7 per cent.; 2 millions of 7 to 11½ per cent.

Of the capital returned otherwise than bearing preferential interest, amounting to 134½ millions, about 7½ millions received no dividends at all. 5½ millions received dividends from 1 to a fraction under 2 per cent., 2½ millions from 2 to a fraction under 3 per cent., ¾ of a million from 3 to a fraction under 4 per cent., 40½ millions from 4 to a fraction under 5 per cent., 60½ millions 5 per cent., 5½ millions from 5½ to a fraction under 7 per cent., 2 millions from 7 to 10 per cent.

Of the loans, amounting to nearly 40½ millions, 1½ millions received interest at rates under 4 per cent., 24½ millions 4 per cent., 5½ millions 4½ per cent., 4½ millions 4½ per cent., 8½ millions 5 per cent., ½ million rates varying from 5½ to 8 per cent.

Of the stocks, amounting to 123 millions, ¾ of a million received no interest, 1 million received less than 4 per cent., 68½ millions 4 per cent., 6½ millions 4½ per cent., 24½ millions 4½ per cent., 19½ millions 5 per cent., 2½ millions 6 per cent.

REVENUE.

Under this head are omitted on the one side the receipts from navigation, steamboats, tolls, rents, etc., and on the other side the expenses connected with steamboats, harbors and canals, etc. It appears that the total receipts from railway working amounted to £58,982,753 on 16,658 miles for 1875, against £56,899,498 on 16,449 miles for 1874, against £55,675,421 on 16,082 miles for 1873, against £51,304,114 on 15,814 miles for 1872, and against £47,107,558 on 15,376 miles (as returned by companies, but which may more correctly be stated as 15,611 miles) for 1871; while the total expenses of railway working were £32,198,196, for 1875, against £31,647,517 for 1874, against £30,060,112 for 1873, against £25,652,753 for 1872, and against £22,632,046 for 1871. The proportion of working expenses to gross receipts was, therefore, 54.6 per cent. for 1875, against 55.6 per cent. for 1874, against 54.0 per cent. for 1873, against 50.0 per cent. for 1872, and against 48.4 per cent. for 1871; and the percentage of net receipts to total capital was, as already stated, 4.43 for 1871, 4.51 for 1872, 4.35 for 1873, 4.14 for 1874, and 4.25 for 1875.

The proportion of expenditure to receipts for the years 1870, 1871, 1872, 1873, 1874 and 1875 in each division of the United Kingdom was as follows:

In England and Wales—1870, 48; 1871, 47; 1872, 49; 1873, 53; 1874, 55; 1875, 55. In Scotland—1870, 50; 1871, 50; 1872, 51; 1873, 57; 1874, 57; 1875, 52. In Ireland—1870, 52; 1871, 53; 1872, 53; 1873, 56; 1874, 57; 1875, 55.

Looking at the above it may be noticed that, while the proportion of expenditure to receipts in England and Wales remained at 55 per cent. in 1874 and 1875, in Scotland, after having remained at 57 per cent. for the years 1873 and 1874, it decreased to 52 per cent. in 1875; and in Ireland, after having been 56 per cent. in 1873 and 57 per cent. in 1874, it decreased to 55 per cent. in 1875.

The total receipts from passenger trains increased from £20,622,080 for 1871 to £22,287,555 for 1872, to £25,553,892 for 1873, to £24,893,615 for 1874, and to £25,714,681 for 1875; while the total receipts from goods trains increased from £26,484,978 for 1871 to £29,016,559 for 1872, to £31,821,529 for 1873, to £32,000,883 for 1874, and to £33,268,072 for 1875.

The percentage of receipts from passenger and goods traffic for the United Kingdom, which was in 1868 as 49 from passengers to 51 from goods, and which remained in 1872 the same as in 1870 and 1871—namely, as 44 from passengers to 56 from goods, became in 1873 as 43 from passengers to 57 from goods, and in 1874 and 1875 as 44 from passengers to 56 from goods. But it was very different in the three kingdoms. In England the percentage proportions of receipts from passengers and goods were nearly the same as in the three kingdoms combined. In Scotland those proportions decreased from 41 in 1858 to 37 in 1875 for passengers, and increased from 59 in 1858 to 63 in 1875 for goods. In Ireland they decreased from 66 in 1858 to 54 in 1875 for passengers, and increased from 34 in 1858 to 46 in 1875 for goods.

PASSENGER RECEIPTS.

There has been during the year an increase of £226,155 from first-class, a decrease of £256,589 from second-class and an increase of £639,224 from third-class passenger receipts. The receipts from first-class passengers were £39,948,812 in 1870, £41,148,108 in 1871, £41,319,185 in 1872, £41,373,274 in 1873, £41,499,351 in 1874 and £42,725,506 in 1875; and those for second-class passengers were £24,925,542 in 1870, £25,167,536 in 1871, £24,198,201 in 1872, £23,984,718 in 1873, £24,099,181 in 1874 and £23,842,592 in 1875; but those from third-class passengers increased from £7,473,727 in 1870 to £8,115,304 in 1871, to £10,318,761 in 1872, to £11,760,586 in 1873, to £12,346,605 in 1874 and to £12,986,829 in 1875. The numbers of first-class passenger journeys increased from 31,839,091 in 1870 to 35,642,199 in 1871, to 37,678,538 in 1872, to 38,310,754 in 1873, to 39,274,759 in 1874, and to 43,708,886 in 1875; and while the second-class passenger journeys were 74,153,13 in 1870, 81,021,940 in 1871, 72,459,562 in 1872, 70,827,428 in 1873, 72,262,968 in 1874, and 70,525,171 in 1875; the passenger journeys of the third-class increased continuously from 234,012,194 in 1870 to 258,566,615 in 1871, to 312,736,722 in 1872, to 346,652,006 in 1873, to 366,302,689 in 1874, and to 392,741,177 in 1875.

The general inference may be drawn from these figures, that the first-class fares and facilities are so far satisfactory as to lead to a progressive and continuous increase of first-class passengers; that the second-class fares, in proportion to the advantages afforded, are not sufficient even to keep up the number of second-class passengers; and that the third-class traffic is the most elastic and most worthy of attention, with a view to increase of facilities and accommodations, as the most profitable to the companies. At the same time, it must not be forgotten that such general inferences are subject to important modifications on different systems, and that the conditions of passenger traffic vary materially on different parts of the same system.

The numbers of season and periodical tickets increased from 156,403 in 1870 to 183,392 in 1871, to 273,342 in 1872, to 314,579 in 1873, to 493,957 in 1874, and to 597,257 in 1875; these totals being inclusive of workmen's weekly tickets. The figures below show the numbers of workmen's weekly tickets issued by a few important companies during the year 1875: Great Eastern, 52,837; London, Chatham & Dover, 26,715; North Staffordshire, 19,584; Caledonian, 17,017; Manchester, Sheffield & Lincolnshire, 12,022.

The receipts from season and periodical tickets have increased from £866,488 in 1870 to £781,778 in 1871, to £892,348 in 1872, to £978,967 in 1873, to £1,069,181 in 1874, and £1,151,248 in 1875. The receipts from luggage, parcels, carriages, horses, dogs, mails and such miscellaneous sources of traffic by passenger trains, have increased from £2,262,669 in 1870 to £2,406,002 in 1871, to £2,553,595 in 1872, to £2,764,020 in 1873, to £2,876,393 in 1874, and to £3,009,060 in 1875.

GOODS RECEIPTS.

The receipts from goods traffic as distinguished from those from passenger traffic are taken to include receipts on account of the conveyance of minerals, general merchandise, live stock, and all traffic by goods trains. But it must be remembered that on some railways the greater portion of the traffic, and on other railways smaller portions of the traffic are carried in mixed trains; and that while the receipts from goods and passenger traffic are kept separately, no attempt is made to separate the expenses of goods and passenger trains from one another. The total receipts from goods trains have increased from £24,115,150 in 1870 to £26,484,978 in 1871, to £29,016,559 in

1872, to £31,821,529 in 1873, to £32,005,883 in 1874, and to £33,268,072 in 1875; and of these the receipts from the conveyance of minerals were £3,392,518 in 1870, £10,029,258 in 1871, £11,226,157 in 1872, £12,605,462 in 1873, £12,450,256 in 1874, and £13,405,283 in 1875; while those from the conveyance of general merchandise increased from £13,810,196 in 1870 to £15,418,171 in 1871, to £16,687,880 in 1872, to £18,047,756 in 1873, to £18,375,922 in 1874, and to £18,630,490 in 1875; and those from the conveyance of live stock increased from £912,450 in 1870 to £1,037,558 in 1871, to £1,077,867 in 1872, to £1,144,760 in 1873, to £1,156,381 in 1874, and to £1,204,548 in 1875. In considering the relative importance of these branches of traffic, it may be pointed out that the general merchandise receipts were for 1871 about 15 times; and for the years 1872 to 1875 between 15 and 16 times the live stock receipts; while the mineral receipts, after having decreased, as between 1873 and 1874, from 11.1 to 10.8 times, again reached 11.1 times the live-stock receipts in 1875. In other words, in the year 1875 the receipts from the conveyance of general merchandise formed 56.00 per cent., those from the conveyance of minerals 40.30 per cent., and those for the conveyance of live stock 3.62 per cent. of the total goods receipts; leaving .08 per cent., representing a sum of £27,761, accounted for under the head of unclassified receipts from goods traffic.

RECEIPTS PER OPEN MILE.

The total receipts per mile of open railway, which increased from £2,786 in 1870 to £3,064 in 1871, to £3,244 in 1872, and to £3,462 in 1873, fell to £3,459 in 1874, but again increased to £3,540 in 1875. The increase in passenger traffic was from £1,235 in 1870 to £1,340 in 1871, to £1,409 in 1872, to £1,483 in 1873, to £1,513 in 1874, and to £1,548 in 1875; while the goods traffic, which increased from £1,551 in 1870 to £1,724 in 1871, to £1,785 in 1872 and to £1,979 in 1873, after having fallen to £1,946 in 1874, again increased to £1,997 in 1875.

The total receipts per open mile were, for 1875 £1,225 in Ireland, £2,417 in Scotland, and £4,223 in England; against, for 1874, £1,186 in Ireland, £2,309 in Scotland, and £4,142 in England; against, for 1873, £1,209 in Ireland, £2,324 in Scotland, and £4,139 in England; against, for 1872, £1,140 in Ireland, £2,342 in Scotland, and £3,895 in England; against, for 1871, £1,118 in Ireland, £1,986 in Scotland, and £3,672 in England; and against, for 1870, £1,049 in Ireland, £1,847 in Scotland, and £3,523 in England. The receipts per open mile from mail traffic were for the United Kingdom £247 for 1868, £37 for 1870, £38 for 1871, £39 for 1872, and £40 for each of the years 1873, 1874 and 1875.

WORKING EXPENDITURE PER OPEN MILE.

The total expenditure per open mile for the United Kingdom was £1,357 in 1870, £1,471 in 1871, £1,622 in 1872, £1,866 in 1873, £1,924 in 1874, and £1,933 in 1875. In England it was £2,316 in 1875, against £2,294 in 1874; in Scotland, £1,266 in 1875, against £1,312 in 1874; and in Ireland, £677 in 1875, against £671 in 1874. The following is a detailed statement of the different branches of expenditure per open mile for the years 1873, 1874 and 1875:

	1873.	1874.	1875.
Maintenance of way and works	£366	£398	£393
Locomotive department	867	549	519
Rolling stock	148	156	165
Traffic expenses	824	850	873
General charges	70	72	76
Rates and taxes	67	72	74
Government duty	31	36	45
Compensation for personal injuries	23	22	23
Compensation for damage to goods	14	15	17
Legal and parliamentary expenses	24	19	18
Miscellaneous	32	35	30
Total	£1,933	£1,924	£1,933

TRAIN-MILEAGE RECEIPTS AND EXPENSES.

The total number of miles run by trains during the year 1875 was 209,528,186, against 200,484,263 during 1874, showing an increase of 9,043,923 miles, or, say, 4½ per cent., which was about 8 per cent. more than the increase of 1874 over 1873. Of the above 100,731,071 miles were by passenger trains, and 104,635,056 miles by goods and mineral trains. The receipts per train mile were £1,630 for 1870, £3,13d. for 1871, £4,56d. for 1872, £7,71d. for 1873, £8,11d. for 1874, and £7,56d. for 1875; while the working expenses per train mile were 30.02d. for 1870, 30.33d. for 1871, 32.27d. for 1872, 36.57d. for 1873, 37.89d. for 1874, and 38.83d. for 1875. Analyzing these train mileage receipts and expenses as regards the three kingdoms, it would appear that the train mileage receipts were for 1870, 1871, 1872, 1873, 1874 and 1875 respectively: In England, 63,64d., 64,93d., 66,21d., 69,48d., 69,55d. and 68,44d.; in Scotland, 51,69d., 52,58d., 54,81d., 57,58d., 60,03d. and 62,08d.; and in Ireland, 60,36d., 61,73d., 62,02d., 64,31d., 64,19d. and 66,05d.; while the train mileage expenses during the same periods were—in England, 30,83d., 30,81d., 32,83d., 37,18d., 38,52d. and 37,54d.; in Scotland, 25,86d., 26,22d., 28,33d., 32,61d., 34,10d. and 32,52d.; and in Ireland, 31,54d., 32,66d., 33,90d., 35,85d., 36,61d. and 36,45d.

TRAIN-MILEAGE EXPENSES IN DETAIL.

The details of the expenses per train-mile for the United Kingdom for the years 1873, 1874 and 1875 were as follows:

	1873.	1874.	1875.
Way and works	7,18d.	7,85d.	7,49d.
Locomotive charges	11,09	10,80	9,90
Rolling stock	2,90	3,06	3,15
Traffic expenses	10,26	10,89	10,94
General charges	1,37	1,41	1,45
Rates and taxes	1,31	1,42	1,41
Government duty	0,62	0,73	0,86
Compensation for personal injury	0,44	0,45	0,44
Compensation for damage to goods	0,28	0,30	0,32
Legal and parliamentary expenses	0,48	0,38	0,34
Miscellaneous	0,63	0,69	0,58
Total	36,67	37,89	36,88

The total cost per train mile showed an increase in 1871 of 31d., in 1872 of 1.94d., in 1873 of 4.30d., and in 1874 of 1.32d., but a decrease in 1875 of 1.01d. It will be seen also that while the total expenditure per open mile increased by £114 in 1871, £15 in 1872, £244 in 1873, and £58 in 1874, the increase in 1875 was only £9; and that while in the permanent way and locomotive departments there had been both per train mile and per open mile a continuous increase until 1874, in the year 1875 there was a decrease in both these branches of expenditure. It will also be noticed that while the rolling stock charges in 1875 increased from £156 to £165 per open mile, and from 10.83d. to 10.94d. per train mile, the traffic expenses only increased from £550 to £573 per open mile, and from 10.83d. to 10.94d. per train mile, being less than the average annual increase, and thus, too, in spite of the outcry which has been raised in some quarters against the expense of working the block system and employing extra signalmen for the purpose.

The figures in Table No. 8 showing the details of the train-mileage expenditure on the lines of certain companies will be found to vary considerably for the same branches of expenditure, and to a much greater extent than might, on a fair consideration of the different conditions and circumstances under which the various lines were worked, be reasonably expected. Thus the total expenditure per train mile varied in 1875 from 31.85d. for the Caledonian to 49.94d. for the Lancashire & Yorkshire; the charges for maintenance of way and works varied from 4.97d. for the London, Brighton & South Coast to 11.64d. for the Great Southern & Western (of Ireland); the total charges for locomotive and rolling stock varied from 11.01d. for the Great Western to 18.00d. for the Northeastern; and the traffic and general charges varied from 9.26d. for the Great Southern & Western of Ireland to 18.07d. for the Lancashire & Yorkshire. It is very difficult, on any supposition of annual charges against revenue for maintenance and renewals being continuously and regularly made, to account for some of the excessive variations in the charges so made in the same year on the above and other lines of railway.

NET PROFIT PER TRAIN MILE.

The net profit per train mile increased from 31.61d. in 1870 to 32.8d. in 1871, decreased to 32.29d. in 1872, to 31.14d. in 1873, and to 30.22d. in 1875, but again increased to 30.68d. in 1876. The following statement shows the net profit per train mile in each division of the United Kingdom for each of the years 1870, 1871, 1872, 1873, 1874 and 1875: England and Wales, net profit—1870, 32.96d.; 1871, 34.12d.; 1872, 33.38d.; 1873, 32.30d.; 1874, 31.03d.; 187

This is a mistaken idea, and mistakes of this sort make "hard times" for a great many railroads.

I will relate a case in point:

About three years ago I was desired, in competition with a friend in the spring business, to propose an equipment of bolster springs for 300 freight cars, to fulfill the following requirements, viz.:

"The best spring that could be furnished to carry a ten-ton load, and cost not more than \$30.00 per car."

My proposition was to furnish an equipment for each car, of 12 nested spiral springs $5\frac{1}{2} \times 7$, 2 spirals per nest, with a carrying capacity of 21,000 lbs. at one-half compression and containing 210 lbs. steel. Price \$29.40 per car (=14 cents per pound).

My friend proposed to furnish for each car:

4 iron-cased springs, 7 spirals per spring, 7 in. high over castings, capacity of 26,000 lbs. at one-half compression (amount of material not stated). Price, \$25 per car.

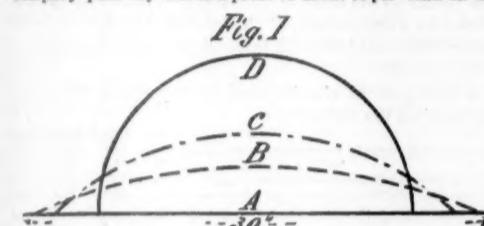
The contract was awarded to my friend on the following grounds:

1. That his spring held up the greatest weight, and was therefore the best.

2. That his price was the lowest by \$4.40 per car, thereby saving the company \$1,320 on this lot of 300 cars.

These conclusions were the result of a private "test" (?) with a lever machine, from which "test," "interested parties" (i. e., spring men) were excluded.

The most remarkable thing about this remarkable stroke of "economy," as I afterwards discovered, was the fact that the company paid my friend a profit of about 75 per cent. on his



"best spring that could be made for less than \$30.00 per car," while my proposition contemplated a margin of about 10 per cent. (This was in the early part of 1873.)

His springs contained 98 lbs. of steel per car and 116 lbs. iron castings against my 210 lbs. net steel (no castings); yet the "spring tested" showed that his carried the *most weight*.

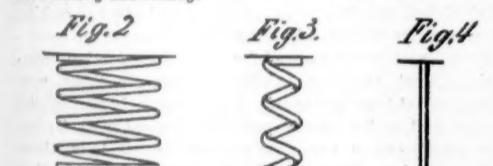
I was informed that my friend, in response to the question of a railroad official, explained this discrepancy by saying that it was owing to the *superior quality of steel* used in making his springs.

The fact was, that we were both buying the same quality of steel, from the same manufacturer, at the same price, at that time, and that this "remarkable" showing was accomplished by a simple mechanical trick, with which all spring men are familiar.

Let us refer to the rudimentary principles of spring-making and see how this railroad company came to pay \$7,500 for "springs" that cost \$4,500 (a liberal estimate of cost in those days), and were really not worth their cost, as springs.

It is a rule, well understood in spring-making, that increase of carrying capacity, or, more properly speaking, resisting force of a spring, is created by distortion of the fibres of steel of which it is composed.

Thus in making a leaf for a semi-elliptic, of a plate of steel say 30 in. long, in proportion as the curve given the leaf defects from the straight line A (its original form), as shown in illustration below, we get increased carrying capacity, but less elasticity and vitality.



If a leaf deflecting 3 in. from A, as shown by line B, takes 500 lbs. to compress it $\frac{1}{2}$ in., a greater weight would be required to compress it $\frac{1}{2}$ in. if the same leaf were made to conform to line C, which shows a deflection of 5 in. from A. Increased strength would be acquired, but less elasticity, and so on until we get to the form of the perfect arch D, where the maximum of strength, or "carrying capacity" is reached, with an entire absence of elasticity.

The vitality or life of a spring is the maximum number of vibrations it is capable of, under a given pressure, before losing "set" or breaking.

If the amount of resisting force required of it at each vibration is increased by changing its form, the number of vibrations of which it is capable will be proportionately lessened.

Thus, in the above illustration, if at 3 in. "set" it requires a pressure of 500 lbs. to produce a vibration of $\frac{1}{2}$ in., and at 5 in. "set" say 800 lbs. to produce $\frac{1}{2}$ in. vibration, this piece of steel would be capable of a less number of vibrations under the second condition than under the first, before becoming worn out or broken, as it must ultimately become under either condition.

It is precisely the same in the spiral, which embodies the same principle.

Now, I believe that if it is important to have "springs" in a car, it is quite as important to have something that contains the element of "spring" (viz., elasticity), which many so-called "springs" do not. If it is not important, we might with propriety proceed further in the direction of cheap spring economy and put in a strong cast-iron "spring" that would "hold up" as much load as any of them, and be much cheaper.

If a spring is designed to absorb the shocks of service, it is

manifestly wrong to deprive it of the *very feature* upon which it depends for its quality at an absorbent, in pursuit of the mistaken idea that you can thereby get a maximum amount of service from a minimum amount of material.

For purposes of spring, fig. 2 is better than fig. 3, because the latter is not so much like fig. 4, or a simple post.

If, for experiment, you were to ride over a rough road, and try each of the above forms, you would find that the shocks communicated by rough joints, etc., would have the following effects :

No. 4 would hurt a passenger like a succession of kicks.

No. 3 would "bounce" him violently.

No. 2 would absorb the shocks, and a passenger would be sensible only of a slight undulating motion, something like that of good buggy spring.

If you were confined to these three forms for the selection of a spring to ride upon, you would undoubtedly select the largest, and if your freight cars and road-bed had a voice in the matter, they would undoubtedly agree with you.

This was the mistake in the matter of the 300 cars. The official who decided the matter did not make an intelligent comparison of the two propositions, and here are the results of his error :

1. The "springs" were too rigid for good service under empty cars or light loads, thereby causing serious damage to cars and road-bed.

2. Nearly all of them became broken.

3. All of them have been removed and replaced with other springs.

4. The railroad is now in the hands of a Receiver.

I will not say positively that this clean waste of \$7,500 put the company into a Receiver's hands, but it did its share.

The above example, and similar instances that have come to my notice, encourage me to suggest that it is not always sound economy to buy a *cheap* spring because it will carry a big load.

GEO. KINSEY.

CINCINNATI, Jan. 12, 1877.

Railroads from the United States through Mexico and Central and South America to Valparaiso and Buenos Ayres, and through British Columbia, Alaska and Kamtschatka to Japan, China, the East Indies and Europe.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a late number of your valuable paper there was an article referring to the proposed line of railroad from San Francisco to Valparaiso and Buenos Ayres, through Mexico and Central and South America, respecting which project I take leave to say, that long since it appeared to me to be a most desirable undertaking, opening as it would to the various industries of the United States new outlets for their productions, the several States through which it would be constructed possessing all the elements of commercial wealth, and offering great inducements for the expansion of American enterprise and industry; and with this great object in view, at the opening of the Centennial exhibition, I submitted to the Chamber of Commerce and Board of Trade at Philadelphia a plan for the holding of a convention in that city, for the purpose of bringing the subject not only before the American people, but also before the people of the several States through which it would pass, representatives from which being then present at the exhibition in greater number than ever heretofore. I also submitted it to the Emperor of Brazil and his minister to this country, and also to other ministers from the South American republics, my project being to recommend to the several States of Central and South America the construction of a line of railroad through their respective territories running north and south, and so arranged that all united would form a continuous direct line from Mexico to Valparaiso, Buenos Ayres and Rio Janeiro.

The matter was not brought forward publicly at Philadelphia, but it is now very gratifying to ascertain that it has found favor with the people of San Francisco, and that some of the leading men and capitalists of that city have taken hold of it, and propose to carry it forward energetically, as they do whatever they determine on.

The construction of this road would give a great impetus to our manufacturing and mercantile interests, and to every branch of trade and commerce generally, opening, as it would with others, the markets of the interior of those countries, particularly of the great and rich empire of Brazil, with which important country our speediest mode of communication now is by way of Liverpool, England, and from there by steamship to Rio Janeiro.

By the construction of this route the United States would also be brought into closer connection with the growing settlements of Australia and Southern Africa, by lines of steamships from Valparaiso and Buenos Ayres.

It is evident therefore that the completion of this project is of great importance and deserving of all the aid and encouragement which the American people can give it.

But to complete our system of railroads and bring the United States into direct communication with the other great divisions of the globe there is one route to be constructed which is destined to connect this continent with Asia and Europe.

The European and Asiatic profiles of that line have already been surveyed and marked out by Russian engineers under the authority of their government—that is, from Moscow via Orenburg to Pekin and a port on the Yellow Sea in China, and via Irkoutsk to Nicholaieff on the Amoor River, and to Ochotsk, thus connecting their empire with the great empires of China and Japan; for through the Russian island of Saghalien by a branch from Nicholaieff the connection with the Japanese empire then becomes a matter of easy accomplishment.

For the people of the United States to share in all the advantages to be derived by the completion of this undertaking, it may be necessary for them through the medium of their government to approach that of Russia, and by treaty lay the foundation for the undertaking simultaneously by both people.

If the people of the United States will construct a railroad from Washington Territory, connecting there with the Northern Pacific, and through British Columbia and Alaska to a port on Behring Strait, which is a total length of only about 1,500 miles, there cannot be a doubt but that the Russian Government will authorize and encourage the construction of a railroad from Ochotsk through Kamtschatka to a port on their side of Behring Strait, thus completing a continuous line of railroad from Valparaiso and Buenos Ayres to Asia and all Europe through the United States.

In aid of commerce between distant nations the greatest achievements have been accomplished frequently through the instrumentality of those not at all engaged in that pursuit.

The missionary, and the man of science, and the explorer, are its pioneers. So it was the Jesuit fathers who first lifted the veil of mystery that separated China, Japan, our western territories, the interior of South America, Brazil and Paraguay from the then outer world. To Humboldt not only the scientific but the commercial world is indebted; and Livingston, at the cost of his life, and Stanley, have penetrated the secrets of Central Africa, and pointed out the road for the engineer to lay the iron bands across the desert to the rich interior regions of that land of mystery. In the quiet of his study our scientist, Professor Henry, whom the learned bodies of all countries delight to honor, has given his consideration to this project submitted to him by me, and he pronounces it not only feasible, but a work of national importance, worthy of the age, and which ought to be carried forward. I have also submitted it to the government of British Columbia, where it has been approved and encouraged, and obtained the promise of all the aid that can be there afforded. I also had it brought before the European Geographical Convention held in Paris, in May, 1875, where it was warmly approved by the Russian delegate.

Through your influential journal, representing as it does so many various interests that would be benefited by the construction of this great work, I submit it for the earnest consideration of the people of the United States, hoping also that the press may lend its powerful aid in calling the attention of statesmen, legislators, and the public generally to the consideration of its importance.

JOHN A. LYNCH.

WASHINGTON, D. C., Dec. 26, 1876.

[Before we build these roads, suppose we do two things: first estimate the amount of traffic which they would be likely to get, and second, learn their cost. Meanwhile, we may as well remember that the seas are not unnavagable, that ten miles of railroad will cost as much as a first-class ocean steamer, and that if the steamer don't pay on one route it can be put upon another, while if the railroad don't pay, the capital cannot be transferred but is sunk forever.—EDITOR RAILROAD GAZETTE.]

A Suggestion on Inspecting Bridges.

CLEVELAND, Ohio, January 22, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I submit, for the consideration of engineers having charge of the erection and maintenance of railway bridges, the subjoined suggestion of a plan for enabling their bridge inspectors to determine whether or not each rod under tension in a bridge has been properly set up in the erection of the structure; and at any time afterward whether or not each such rod is doing its duty.

When a bridge is about to be set up, let one rod out of each lot of a certain length and diameter be suspended at one end and loaded at the other end with an actual weight equivalent to the strain that every rod of that length and diameter ought, according to the calculations of the designer of the bridge, to be subjected to in the structure when ready for the imposition of its live load. Then put upon the rod, with white paint, a ring, at, say, five feet above the highest point at which the rods will be held in the angle-blocks on the lower chord of the bridge. Then provide a steel hammer, of a known weight, fitted with a handle of a known length, and as many tuning-forks as there are sizes of rods in the bridge. Then with his left hand, with his left arm fully extended, let the inspector hold a tuning-fork firmly against the rod, at the painted ring, while with his right hand, with the arm fully extended, he strikes the rod, at the ring, a smart blow with the hammer. Then, immediately, removing the tuning-fork, let him note the sounds given out by the rod and the fork respectively, and by filing the fork bring the fork into tune with the rod. Then let a designating number be stamped upon both rod and tuning-fork; and repeat the operation for each set of rods in the bridge. Thereafter, when the bridge is set up, and still thereafter, when the inspector is to go through that bridge, he will take the hammer and set of tuning-forks belonging to that structure, and tune his rods. Thus may he guard against, or detect, that condition too frequently existing in bridges, under which some rods are unduly strained and some are doing almost no work.

J. M. GOODWIN.

A Woman's Opinion of Passes.

Gail Hamilton says that her experience with free passes has been of the most short, slender and spasmodic kind, but so far as it has extended it has been one of unalloyed delight. "It has always seemed a waste," she says candidly, "to pay money for going from place to place, because you want all your money to spend when you get there. I have never yet refused a railroad pass, and Heaven helping me, I never will!"

Good Wages.

An exchange says that an employee in the repair shops situated in its town, being asked how business was replied: "Oh, first rate. We don't get any pay to speak of; but they don't charge us any admission for going into the shops yet."

A Fast Road.

The Litchfield (Conn.) Engineer tells a story of a man who left a train on the Shepaug Railroad at Washington and started to ride home in his sleigh. Suddenly recollecting that he had left a package in the car, he turned his horse and drove to New Preston, the next station. After waiting there some time the train came up and he entered the car and recovered his package.



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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particular as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

TRAIN ACCIDENTS IN 1876.

Our record of train accidents for the month of December enables us to make a resume of the accidents of the year, in which we classify the accidents by their nature and causes, hoping thereby to throw some light on causes of accidents, and to indicate the directions in which efforts should be made to lessen their number and mitigate their consequences.

Before going further, we will repeat what we have often said in connection with this record, but concerning which errors are often made by those who comment on it, that it is a record of train accidents only, and not of all casualties occurring on railroads. The numerous cases where men, animals or vehicles are run over by passing trains are not chronicled in our record except when they cause the derailment or other injury to the train (which seldom happens); and such accidents as happen to persons falling from trains, etc., are likewise foreign to our record, which is one of train accidents only. Further, our sources of information are chiefly the newspapers, with some help from correspondents. Papers from all parts of the country are searched, and not many accidents which are reported at all escape us. But there are a great many accidents which are never reported in print. Those which cause death or injury to a person, considerable destruction of rolling stock or considerable delay to trains are usually reported. Thus our record is chiefly of the more serious accidents. Probably not many are omitted which cause death or injury to passengers or train men, and as a record of injuries to persons by train accidents it is approximately complete.

The year 1876 was a favorable year for working railroads because of the mildness of the winter; and the severity of the weather—the degree of cold and the amount of snow—appears to be the greatest predisposing cause of accidents, the months of very severe weather with many snow storms invariably showing a very large number of accidents. January and February of 1876 were unusually mild, and accidents then were few; March was stormy in some parts of the country, and the effect is shown in the list of accidents. December again was a snowy month, or part of it was, in some districts, but it seems not to have increased accidents greatly. The effect of the severe weather we have been experiencing will be seen more fully in the record for January, 1877, when it is made up.

There was one unusual occasion for accidents in 1876 in the extraordinary passenger traffic of the three fall months due to the Centennial Exhibition. On many roads trains were almost constantly overloaded, and very frequently behind time; on several they were multiplied to an extent never known before. This complication and irregularity of traffic is likely to lead to accidents; but in this case the number of accidents, though larger than usual, seems not to have been in proportion to the increased traffic, and the railroad companies showed decided ability in adapting their operations to the emergency.

There was one other reason why it might have been suspected that 1876 would go hard with the railroads, and that is their poverty. For three years the managers of most roads had been giving their best energies to the enforcement of severe economy, and it was to be expected that in many cases the roads were the worse for it—that road and rolling stock were not in condition to endure hard service much longer. As we have said, they had the mild winter in their favor; but that they endured the other nine months of the year so well seems to us an indication that the number of "starved" roads could not have been unusually great: there always are some.

We have now made records of train accidents for four complete calendar years. The numbers of accidents and of persons killed and injured in them for each of these years have been:

	1873.	1874.	1875.	1876.
Accidents.....	1,263	980	1,201	982
Killed.....	276	204	234	328
Injured.....	1,172	778	1,107	1,007

The number of accidents thus appears to have been nearly the same last year as in 1874, but fatal injuries were more than for any preceding year reported. This is due largely to the catastrophe at Ashtabula, by which 80 persons lost their lives—nearly one-fourth of the victims of all the train accidents of the entire year. Without this, however, the accidents were more than usually fatal, one of the causes of which, doubtless, is the unusual amount of passenger traffic last fall, there having been more accidents to passenger trains than usual. The average number of killed and injured per accident for the four years has been:

	1873.	1874.	1875.	1876.
Killed.....	0.215	0.209	0.195	0.354
Injured.....	0.914	0.800	0.923	1.117

Killed and injured, 1.129 1,009 1,118 1,451

Thus 1876 enjoys the distinction of having had the deadliest accidents. If we were to omit the Ashtabula disaster, there would still be 0.253 killed and 1.113 injured per accident, so that this disaster was not needed to give it this distinction.

The classification of the accidents of each year according to their nature or causes gives the following results:

COLLISIONS:	1876.	1875.	1874.	1873.
Rear.....	150	141	131	187
Butting.....	94	104	87	102
Crossing.....	15	18	19	31
Unknown.....	11	15	23	72
DERRAILMENTS:				
Unexplained.....	185	222	218	315
Broken rail.....	50	107	42	111
Misplaced switch.....	89	81	67	72
Cattle on track.....	46	51	45	54
Wash-out.....	40	44	10	30
Loose or spread rails.....	48	40	18	13
Broken axle.....	38	39	20	21
Accidental obstruction.....	36	37	31	44
Snow or ice on track.....	16	36	13	9
Broken wheel.....	22	33	20	26
Broken bridge or trestle.....	20	26	33	19
Malicious obstruction.....	11	21	22	11
Broken truck.....	10	15	8	7
Broken or defective switch.....	4	15	12	10
Land-slide.....	9	11	..	..
Broken or defective joint.....	1	10	5	3
Broken or defective frog.....	3	8	8	4
Wind.....	2	7	..	..
Rail removed or displaced.....	7	8	7	16
Broken parallel or connecting-rod.....	5	4	..	..
In making flying switch.....	2	4	..	..
Failure of coupling or draw-bar.....	1	3	7	8
Broken car.....	2	3	..	..
Runaway engine.....	..	3	1	6
Running through siding.....	6	2	3	3
Loose wheel.....	3	2	4	2
Open draw-bridge.....	3	2	6	4
Bad track.....	4	2	13	7
Fall of brake or brake-beam.....	..	4	..	9
Careless stopping or starting.....	..	..	3	..
Overloading car.....	1	..	3	..
Bad switching.....	..	..	2	..
Running over man.....	..	..	2	..
Flood over track.....	..	..	..	..
Others (one each).....	1	3	11	7
ACCIDENTS WITHOUT COLLISION OR DERAILMENT:				
Boiler and cylinder explosions.....	23	29	18	19
Broken parallel or connecting-rod.....	7	14	8	11
Broken axle.....	3	13	..	..
Cars burned while running.....	11	10	16	2
Broken tire.....	9	..	..	..
Broken crank-pin.....	2	..	..	..
Flue collapsed.....	1	4	..	..
Other breakage of rolling stock.....	4	5	10	19
Steam chest explosion.....	..	..	2	..
Flue plug blown out.....	..	..	2	..
Failure of bridge or trestle.....	..	..	2	..
Mass falling on running train.....	1	..	2	2
Accidental obstruction.....	..	..	..	11
Malicious obstruction.....	1	..	..	3
Unknown.....	..	..	2	9
Totals.....	982	1,201	980	1,283
RECAPITULATION:				
1876.	1875.	1874.	1873.	
Collisions.....	279	278	260	392
Derailments.....	685	840	654	815
Other accidents.....	48	89	66	76
Totals.....	982	1,201	980	1,283
Average number per day.....	2.60	3.39	2.68	3.51

The record of 1876 is more like that of 1874 than any

other. Both years had a mild winter, and the accidents resulting from broken rails were comparatively few. The very large number of accidents from misplaced switches this year is noticeable, and suggests that railroads may have been employing too cheap labor. The number of accidents for which no causes are assigned is smaller than heretofore.

Of the derailments for which causes are assigned, the percentage due to each of the chief causes was as follows in the several years:

	1876.	1875.	1874.	1873.
Broken rail.....	10.6	17.3	9.9	22.2
Misplaced switch.....	18.9	13.1	15.4	14.4
Cattle on track.....	9.7	8.2	10.3	10.8
Wash-out.....	8.5	7.1	2.3	6.0
Loose or spread rails.....	9.2	6.8	3.7	2.6
Broken axle.....	8.1	6.3	4.6	4.2
Accidental obstruction.....	7.7	6.0	11.7	8.8
Broken wheel.....	4.7	5.3	4.6	5.2

As indicating the effect of severe weather on track (not necessarily on iron, however,) we give below the percentages of miles reported for the first and third quarters respectively of each of the four years:

Accidents caused by broken rails in the Quarter including January, February and March and in that including July, August and September, for four years.

	1873.	1874.	1875.	1876.	Total.
First quarter.....	65	20	90	26	201
Third quarter.....	5	5	3	5	18

This indicates that there were eleven times as many accidents by broken rails in the cold as in the hot quarters of the year, and the effect of the severe weather is further shown by a comparison of the breakages in the cold winters of 1873 and 1875 with those in the milder winters of 1874 and 1876.

A more general classification of the causes of derailments gives the following:

	1873.	1874.	1875.	1876.
Defects or failures in permanent way.....	200	146	261	165
" " " rolling stock.....	73	63	101	76
Negligence, carelessness or malice.....	96	107	114	119

Considering the fact that the whole number of accidents was smaller than usual this year, it does not look well to have a larger number than ever before ascribed to "negligence or malice," especially as the cases of malicious obstruction were less last year than previously. "Negligence," however, would apply probably to many, if not most, of the cases of defects and failures of road and rolling stock as well to the cases of misplaced switches, open draws, etc., to which we have applied it above. The former, however, have not been unusually numerous, notwithstanding the severe economy exercised.

The great calamity at Ashtabula will doubtless cause renewed attention to one class of accidents at least. We have chronicled during the past four years the failure of a bridge or trestle, nearly every one under a train. None of them had results anything like as serious; but that most of them were comparatively harmless was much more "accidental" than the failure of the structures themselves. The one lesson of the accident record of 1876 likely to be longest remembered is, how terrible may

must make them so by their own exertions. Voluntary associations, government aid and Centennial Commissions really accomplished very little. The exhibits which were the best worthy of attention were those which were devised and prepared by the manufacturers themselves. While this was so in special cases, there is one defect in uncombined individual effort. This defect is the want of system. Each person or firm is bent on having its own productions fully exhibited, but usually feels no concern in having all the other products which are related thereto displayed. Thus the manufacturers of steel car-axes showed their products in the most complete and thorough manner, but were totally indifferent about the exhibit of car-wheels. Locomotive builders were anxious that American locomotives should be made known to the whole world, but felt little interest in American cars, and so on through the whole list. Now what we want to call attention to and make as clear as possible is the fact that each one of these parties, or rather that each manufacturer or engineer who supplies the material or machinery which forms a portion of our railroad system, is benefited if the whole system is exhibited. Thus, if the wheel manufacturers exhibit the American cast-iron wheels and show clearly their cheapness, and if orders are given for wheels, the probability is that that fact will lead to the axles being bought here too. If American locomotives are ordered, American boiler-plate will be sure to be used. If our method of laying track and of fastening rails should be exhibited by railroad companies, it would lead to orders for rail fastenings, spikes, switches, etc., being sent here, and so on indefinitely. For this reason each manufacturer or engineer whose productions are employed and form a part of the system is interested, or should be, in having the whole of it exhibited as completely as possible. Now in order to do this some careful forethought must be exercised and a plan must be devised by some one competent head. The mere desultory effort of individual parties or firms cannot, or at least will not, be able to think out and put in execution any systematic plan.

The subject has been discussed with various manufacturers of railroad material and machinery and also with engineers connected either directly or indirectly with railroad work, and it has been suggested that a meeting be called to take the subject into consideration, and to adopt some plan by which such a complete exhibit as has been described could be devised, and that steps be taken to have such a plan carried out. The expense attending it would not be very great if distributed among any considerable proportion of those directly interested in it. The chief difficulty would be in having some responsible head or authority to direct that expenditure. It has been suggested that if such a meeting were called, the subject could be discussed, and a committee then be appointed to report a plan of exhibiting our system of railroading, and that the report be submitted for approval and discussion, and the requisite working machinery be then employed to carry out whatever method is adopted. If these suggestions should meet with a sufficient amount of encouragement, we feel authorized in stating that such a meeting will be called, but it is first necessary to know whether the idea is likely to meet with the approval of those who are chiefly interested in it.

Exporting Fresh Meat.

In reviewing the live stock markets for the year, the New York *Tribune* reports an increase in arrivals of cattle at New York of about 5 per cent., compared with the arrivals in 1875, besides some increase in calves and sheep. As it has been a year of poverty among many and of little or no growth in population, this is somewhat noticeable. But it is probably wholly due to a new development in the trade this year, pointed out by the *Tribune*, which bids fair to become important for a large part of the country and to the railroads which carry cattle. This is the establishment and growth of the export of slaughtered cattle. It says that the average shipments per week are now about 1,000 carcasses from New York and 500 from Philadelphia. These exports were very small at the beginning of the year, but have grown so that several of the steamer companies have fitted up refrigerator compartments at considerable expense especially to accommodate this traffic. The increase in live stock receipts for the year does not indicate the bulk of this business, because there has been at the same time an increase in the arrivals of slaughtered beef at New York, brought in refrigerator cars from Chicago, Kansas City, etc.

The importance of this new traffic is the greater because, in the first place, the newer settlements of the Far West are so distant from market that it does not pay to raise grain there; and, in the second place, because most of the country as far west as the middle of Kansas and Nebraska, say, is really good for little else than stock raising, but is very good for that. There is an immense territory which we cannot expect to see utilized for a generation or two unless a market can be found for a much greater than the present supply of cattle. It would not take much of it to overstock the present American market. But if fresh beef can be exported, we can compete for the supply of a market several times as large as our own. If we can supply Europe with fresh beef as we do with breadstuffs and salted provisions, we will find room for a new expansion of our agricultural industries and

occasion for the utilization of a vast territory now unoccupied, and we shall meanwhile add materially to the well-being of the poorer classes abroad. All traffic of this kind is a clear addition to the traffic which previously existed, not a diversion from one form to another, and therefore is to be especially encouraged. At present a considerable part of the profits of the trunk lines and of many Western railroads come from the live stock consumed in New York and New England. A small share even of the supply of a city like London, with four times the population of New York city, is worth contending for.

THE SUICIDE OF MR. CHARLES COLLINS, the Chief Engineer of the Lake Shore & Michigan Southern Railway, is one of the most painful events connected with the horrible Ashtabula disaster; for we suppose that the suicide was indirectly caused by the accident. Mr. Collins took great pride in the road under his charge, or rather he had an affection for it such as a parent has for a child. For many years he had devoted himself to it, and he had so nearly realized his high ideal that the track of the Lake Shore road was cited as a model the country over: such perfection of surface and alignment, ballasting and drainage was hardly to be found elsewhere, or at least was found on the Lake Shore earlier than almost anywhere else. To have his pet road fail and fail so disastrously was doubtless such grief to him as men with lower ideals and less devotion to their work never know, and many cannot comprehend. From the evidence taken during the pending investigations, it seems that Mr. Collins had absolutely nothing to do either with the construction or the erection of the bridge. Its maintenance, however, with that of the rest of the road, was in his charge, and he, we suppose, was properly responsible for its inspection and repair. If the bridge inspector was not competent, or if the inspections were insufficient or too infrequent, the Chief Engineer should have known it, and should have had power to remedy the defects.

The report of Mr. Collins' suicide says that he had had little sleep for a long time, and it is altogether probable that he had lost his reason before he took his life. A quiet, unassuming man, he deserves to be remembered as one who has done much to encourage the highest quality of work in the construction and maintenance of permanent way in this country.

THE ERIC ARRANGEMENT SCHEME, which has made so little noise for some months past that many have concluded that it was dead or moribund, now shows some signs of life. Mr. James McHenry seems to give it the benefit of his opposition, but he no longer holds the company in the hollow of his hand. It is said that of the outstanding bonds on which the interest is overdue about \$36,000,000 is held in Great Britain and \$5,000,000 in this country. Holders of a majority of these can decide the fate of the scheme, and, for that matter, of the company itself. If the stockholders do not accept the arrangement while the bondholders do, the result will be simply that, while the reorganized company will not get the benefit of the stock assessments, the old stock will disappear from its capital account, have no voice in its management and no share in its future profits; and the Erie with its present enormous stock capital of \$86,000,000 wiped out would be a snug property for the bondholders. On this head *Herapath's Railway Journal* of Jan. 6 says:

"If shareholders have been hoping against hope that something would turn up to prevent the necessity for the heavy assessment on the shares, both ordinary and preference, they may undeceive themselves. The reorganization scheme will be carried, involving the assessments in question. The company urgently want the money that will be thereby raised, and although the time for payment is postponed, it will evidently be enforced. When we say 'enforced' we mean practically so. There is no power to compel a shareholder to pay four or six dollars per \$100 share; but as he is only admitted into the reorganized company upon making such payment, failure in making it means forfeiture of shares."

This, however, is the first expression of confidence in the eventual success of the scheme that we have seen. Most of the English papers which interest themselves in Erie affairs do not venture an opinion on the matter.

THE CRACKING OF STEEL FIRE-BOXES, as discussed by our Master Mechanics' Association, has attracted attention in Germany, where the *Organ for Railroad Progress*, the leading German journal devoted to railroad engineering, publishes a long summary of the report on the subject made to the last convention.

NEW PUBLICATIONS.

Messrs. G. W. & C. B. Colton & Co. have added to their long list of maps a *County and Township Railroad Map of the State of New York*, and a *Railroad Map of Pennsylvania and New Jersey*, from a new plate, on a scale of about 8½ miles to the inch, which excel in clearness and accuracy anything we have seen heretofore. They are substantially railroad maps, giving no towns or post-offices except stations, though the township boundaries and names are given. But the railroads are located with great care, from the actual surveys wherever practicable, and the lettering is of course clearer than it would be on a smaller map. Clear lettering, by the way, is usually a feature of the Colton maps; though in this rapidly growing country the introduction of new railroads and the development of a crop of new towns every year often make awkward work with an old plate which was a model of beauty and clearness when first engraved. The maps under consideration are especially valuable, because in all these States the railroad net work is so complicated, with meshes so small, that it is next to impossible to trace out all the lines on the commoner map on a smaller scale.

On Long Island, in New Jersey opposite New York, and in many parts of Pennsylvania this is the case. The map of New York contains also a map of the country for 20 miles around the New York City post-office on a scale of five miles to the inch. We have not been unable to discover any errors in the railroads on this map; a few have been constructed since it was engraved. While speaking of these maps, we desire to call attention to the im-

portance of the work done by these cartographers, and especially to the desirability of the co-operation of railroad officers in their efforts to secure the absolutely accurate mapping of lines of railroad. Very great pains are taken to get this information, and usually the work left for the railroad engineer or officer to whom application is made is of the simplest possible kind, requiring but a very few minutes of work. Yet these applications are too often neglected, or the information sent is sometimes shamefully imperfect. There can be no excuse for not giving an accurate map of a line when it has once been finally located; and those in charge of the surveys might easily give a great deal more information which would be of great value in fixing the as yet imperfectly recorded topography of the country. Nearly all the maps are more or less imperfect—often very imperfect—and every accurate survey of a line, especially in a new district, fixes some points hitherto uncertain. This firm makes most conscientious efforts to secure accuracy and completeness, and preserves all the information obtainable with great care. The result of this labor is that maps have to be made over again periodically; and with the expense of this work, the indifference of the great mass of map-buyers, and the carelessness of those who have much of the new information, there is no great encouragement to do good work. We certainly should not get as much as we do but that the cartographers put their hearts and their consciences into the work.

Every one has heard of the letters of Professor Reuléaux, the German Commissioner to the Centennial Exhibition, in which he criticised severely the quality of the objects exhibited by his countrymen, and incidentally the course of German manufactures. The letters have now been collected in a pamphlet (*Briefe aus Philadelphia*) of about 100 pages, which is sent us by L. W. Schmidt, of New York. The attention of those familiar with German brochures (and German books are not usually sold bound) will first be attracted to the elegance of the publication. Usually there is not a great deal to be said in favor of German books, aside from their contents. But Professor Reuléaux' pamphlet is as emphatic a protest against "cheap and bad" work as are the letters which it contains. And, when we read his report on the exhibition of books, we find that it was meant to be so. The whole burden of these letters is that German manufacturers, or many of them, have deteriorated by the effect of a competition which has been directed entirely to price and not at all to quality. The letters are extremely interesting and suggestive, and though largely devoted to the criticism of German industries, they contain much on other European and American exhibits which is of special value, Professor Reuléaux being one of the best authorities in certain fields. He has a very high opinion of our machine tools, hardware, and many other of our manufactures. We quote the following passage: Remarking that the Exhibition showed America to be taking a leading place and in some things the leading place, among manufacturers of machinery, he adduces the following as evidence: "In the first place, it has given further development in certain details, to the steam engine, and has been able to give it a perfection of form which is worthy of admiration: a notable sign; for where beauty of form has been developed, is made the object of special care, and has become a subject of criticism, there the difficulties of adapting the form to use must have been overcome already."

Valentine & Co., the varnish-makers, have designed some most ingenious methods of advertising, one of which, "Silhouettes," is no remarkable as to be well worth noticing, not simply for its artistic character, but for the modesty of its advertisements, which are not permitted to deform or distort the illustrations. They form a little bundle of tinted sheets about 9 in. square, fastened together by an eyelet at one corner, each of which has a silhouette drawn by Mr. F. S. Church. There are sixteen of them inside of the covers, each illustrating a scene to which the name of a vehicle can be attached, as "A Carryall," in which paterfamilias on all fours has his three little ones on his back, etc. There is a refinement, a homeliness and a humor in these which make them very attractive, and have undoubtedly given the collection a place on many parlor tables. The advertising is confined to the simple legend "Valentine's varnishes," on each sheet, a simple card on the front cover and a humorous one on the back cover. We doubt whether there has ever been a more successful attempt to design an advertisement which people would pre-serve.

Mr. John Woodbridge Davis, C. E., has prepared and published a little treatise, entitled *Formula for the Calculation of Railroad Excavation and Embankment*, which is recommended as affording means of doing the trying work of earth-work computations more expeditiously and much more accurately than by older methods. The work is used as a text-book in the School of Mines of Columbia College, Professors Vinton and Roberts esteeming it very highly. The work is sold by G. S. Roberts, School of Mines, Columbia College.

Reporting Foreign Cars.

Mr. C. H. Allen, Receiver of the Paducah & Memphis Railroad, has issued the following circular, directed to connecting lines dated Dec. 20, 1876:

Commencing this date, we will report daily to the proprietors of foreign cars passing over this road, the movement and mileage of each car separately, for which purpose we will use the enclosed form (No. 132), in connection with which, special attention is directed to the accompanying official time table, showing our stations by numbers which correspond with their actual distances from Paducah, so that the number of miles between any two stations is ascertained by taking the difference between the numbers of those stations.

By means of these reports you will be enabled to determine precisely and readily:

1. The location of each one of your cars on any given day, if upon this road, without incurring the trouble and delay of reference to us.
2. The mileage made over this road in any month or part of a month by any particular one of your cars.
3. The aggregate mileage made by all your cars over this

road in any month or part of a month. This can be read at a glance from the latest daily report issued.

Believing that to the extent of our interchange of cars with your line you will find the information thus imparted of undoubted value, we will ask you to give us in exchange the like information regarding our own cars, when they pass over your line, in the same or some similar shape, and with the same daily regularity with which we shall issue our reports.

The following is the heading of "Form 132," above referred to, which is on a slip 3½×8½ in.:

(FORM 132.)

PADUCAH & MEMPHIS R. R.

C. H. ALLEN, Receiver.

PADUCAH, Ky. 187.

Movement and Mileage of Individual Cars,

Belonging to

B. B.

on day of 187.

Car Nos.	STATION.		Miles Run.
	FROM—	TO—	
Forward from last Report,			

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Hanover & York.—At the annual meeting in Hanover, Pa., Jan. 8, John S. Young was chosen President with the following directors: P. H. Glazebrook, Michael Schall, David E. Small, Alex. J. Frey, Wm. McConkey, Geo. D. Klineteller, Wm. Young, Sr., Samuel Shirk, Isaac Leuchs, S. H. Bechtel, W. Latimer Small, Dr. J. P. Smith. The road is worked by the Pennsylvania.

East Berlin Branch.—At the annual meeting in Abbottstown, Pa., Jan. 8, Capt. A. W. Eichelberger was chosen President, with the following directors: Wm. Grumbine, Stephen Keefer, Wm. Bittinger, Dr. S. Meisenheimer, Jacob Besser, Robert M. Wirt, A. Storm, George Diehl, Wm. S. Hildebrand.

Bachman Valley.—At the annual meeting in Hanover, Pa., Jan. 8, Capt. A. W. Eichelberger was chosen President, with the following directors: C. J. Nourse, P. B. Payne, C. L. Johnson, C. N. Simms, Jos. Dellone, Reuben Young, Stephen Keefer, H. C. Shriner, J. W. Gitt, M. Sauble, Elias Wolfgang, Levi Dubbs.

St. Louis, Lawrence & Western.—The Kansas District Court has appointed Charles Summerfield Receiver, in place of George H. Res.

Louisville, Paducah & Southwestern.—The statement that Gen. H. H. G. Minty had been appointed General Manager, made by the St. Louis papers, is pronounced to be untrue, or at least premature, as the future management is not yet decided.

Philadelphia & Reading.—Chief Engineer Lorenz has issued the following order: "Under the reorganization of the Roadway Department, the territories of the different residencies will be divided as follows:

"1. Pottstown Residency, with Mr. Wm. H. Blues as Resident Engineer, will comprise the Main Line and all its branches from the coaling station at Reading south and eastward, being bounded on the west by Sixth street, Reading.

"2. Lebanon Residency, with Mr. W. G. Meigs as Resident Engineer, will comprise all the territory west of Sixth street, Reading, the Lebanon & Tremont Branch, the Schuylkill & Susquehanna Branch west of Pine Grove, and the Berks & Lehigh Branch from Reading to near Slatington.

"3. Pottsville Residency, with Mr. H. K. Nichols as Resident Engineer, will comprise the Main Line and all its branches from the coaling station at Reading northward, the Schuylkill & Susquehanna Branch from Auburn to Pine Grove, and all the coal territory south of the crest line of the Broad Mountain between Tamaqua and Tremont.

"4. Mahanoy Residency, with Mr. Isaac E. Umstead as Resident Engineer, will comprise all the territory north of the crest line of the Broad Mountain and west of the Catawissa territory, taking in the East Mahanoy Branch as far south as East Mahanoy Junction.

"5. Catawissa Residency, with Mr. Wm. G. Yetter as Resident Engineer, will comprise the whole line of railroad, with all its branches, from Broad street, Tamaqua, to Williamsport.

"All roadway foremen will report to their respective engineers, to whom they have been transferred.

"The office of Principal Assistant Engineer having been discontinued, all employees of the Philadelphia & Reading Railroad Company who formerly had to report to the Principal Assistant Engineer, at Pottstown, will in future make their reports to the Chief Engineer, at No. 227 South Fourth street, Philadelphia."

New York Elevated.—At the annual meeting in New York, Jan. 17, the following directors were chosen: John F. Tracy, David Dow, Francis H. Tows, John H. Hall, John D. Mairé, Alfred S. Barnes, A. H. Barney, Harvey Kennedy, John Ross, Augustus Hall, James A. Cowing, William L. Wallace, Milton Courtright. The board elected John F. Tracy, President; Milton Courtright, Vice-President; James A. Cowing, Secretary and Treasurer.

Utica, Clinton & Binghamton.—At the annual meeting in Utica, N. Y., Jan. 18, the following directors were chosen: John Thorn, Isaac Maynard, Robert S. Williams, Henry Hopson, O. S. Williams, J. E. Elliott, A. W. Mills, D. M. Minor, J. W. Forward, Dr. B. West, George B. Phelps, Chas. H. Smythe, Alex. Holland. The board elected O. S. Williams, President; Isaac Maynard, Vice-President; J. W. Church, Secretary. Wm. H. Schuyler was reappointed Superintendent.

George's Creek & Cumberland.—The corporators of this new company have elected officers as follows: President, Dr. G. E. Porter, Lonaconia, Md.; Secretary and Treasurer, Charles Robb, Cumberland, Md. Messrs. Patterson and Sheridan, of Cumberland, have charge of the preliminary surveys.

Philadelphia & Reading Coal & Iron Co.—Mr. E. A. Quintard has been appointed General Sales Agent, with office in Philadelphia. Mr. D. T. Moore succeeds Mr. Quintard as Agent in New York.

Tennessee & Pacific.—Mr. Samuel Watkins has been chosen President, in place of George Maney, resigned. Mr. J. W. Thomas is appointed General Superintendent and R. C. Bradford, Secretary and Treasurer. The two last-named officers hold the same positions on the Nashville, Chattanooga & St. Louis, and Mr. Watkins is also a director of that company.

Grand Trunk.—Mr. John Porteous, late Terminal Agent at Portland, has been appointed General Agent, with office in Montreal, in place of Mr. Stevenson, who resigns on account of ill health. Mr. J. Main succeeds Mr. Porteous as Agent at Portland.

Delaware.—At the annual meeting in Dover, Del., Jan. 11, the following directors were chosen: S. M. Felton, Isaac Hinckley, A. C. Gray, Joseph Bringhurst, Charles Warner, Edward Bringhurst, Jr., A. B. Fideman, Dr. Isaac Jump, Alexander Johnson, Albert Curry, J. Turpin Moore, James Ross, Manlove Hayes. The board re-elected S. M. Felton, President; Manlove Hayes, Secretary and Treasurer. The road is worked by the Philadelphia, Wilmington & Baltimore.

Fair River.—At a meeting of the board held Jan. 13 Mr. Wm. Rotch was chosen a director in place of Charles R. Tucker, deceased. The board then re-elected J. A. Beauvais President and elected H. A. Blood Manager and Superintendent, in place of C. E. Barney, resigned, and E. D. Hewins Clerk and Treasurer, in place of T. B. Fuller, resigned. The new appointments take effect Feb. 1.

St. Louis, Bloomfield & Louisville.—The new board has elected John Thomas President; E. C. Winstanley, Vice-President; C. B. Parkman, secretary; Edward Hurlbut, General Superintendent. The offices are in Toledo, Ohio.

Toledo & Maumee.—The following officers have been elected for the ensuing year: President, C. C. Keyser; Vice-President and Superintendent, W. Taylor; Secretary and Treasurer, R. B. Mitchell. The offices are in Toledo, Ohio.

Connecticut River.—At the annual meeting in Springfield, Mass., Jan. 17, the old board was re-elected, as follows: Daniel L. Harris, Chester W. Chapin, Springfield, Mass.; Oscar Edwards, Northampton, Mass.; Wm. B. Washburn, Greenfield, Mass.; Charles S. Sergeant, Brookline, Mass.; Roland Mather, Hartford, Conn.; S. M. Waite, Brattleboro, Vt.; J. M. Spellman, Edward A. Dana, Boston. The board re-elected Daniel L. Harris, President; Seth Hunt, Treasurer; John Mulligan, Superintendent.

Dallas & Wichita.—At the adjourned annual meeting in Dallas, Tex., recently, the following directors were chosen: W. L. Cabell, J. W. Crowders, F. M. Ervy, H. S. Ervy, Ira Harris, W. H. Gaston, G. W. Irvin, E. C. McClure, A. T. Obenchain, M. Pointer, W. G. Randall, Silas Reed, George Shields, C. M. Wheat.

Woodstock.—At the annual meeting in Woodstock, Vt., Jan. 10, the following directors were chosen: Albert G. Dewey, S. S. Thompson, Charles Dana, F. W. Clarke, Lewis Pratt, Frank N. Billings, Edward Dana, Charles S. Raymond, Otis Chamberlain. The board elected Albert G. Dewey President; Charles Dana, Vice-President; Luther O. Greene, Clerk; F. W. Clarke, Treasurer; Hosea Doton, Engineer; James G. Porter, Superintendent.

Troy & Boston.—At the annual meeting in Troy, N. Y., recently, the following directors were chosen: D. F. Vail, Daniel Robinson, Sylvester Johnson, Lyman Wilder, John H. Willard, Hiram Miller, Samuel M. Vail, Francis S. Thayer, Cornelius L. Tracy, Harrison Durkee, Joseph H. Parsons, Wm. Howard Hart.

Ohio & Baltimore Short Line.—At the annual meeting in Washington, Pa., Jan. 8, C. M. Reed was chosen President, with the following directors: W. W. Smith, S. B. Hays, Dr. Thomas McKenna, Wm. Workman, J. H. Garrett, Wm. Keyser, J. K. Cowen. The board elected J. B. Washington Secretary; W. H. Iiams, Treasurer; W. T. Thelin, Auditor; J. L. Randolph, Chief Engineer. The company is controlled by the Baltimore & Ohio.

Waynesburg & Washington.—At the annual meeting in Waynesburg, Pa., Jan. 8, J. G. Ritchie was chosen President, with the following directors: John T. Hook, S. W. Scott, Samuel Luse, Wm. T. Lantz, Thomas Iiams, Jacob Swart, James M. Dunn, John Ross, Henry C. Swart, Clark Hackney.

Addison.—At the annual meeting in Rutland, Vt., Jan. 17, the following directors were chosen: E. H. Birchard, Gasco Rich, John Hammond, John B. Page, James W. Hickok. The board re-elected John B. Page President. The road is worked by the Central Vermont.

Chicago & Lake Huron.—Mr. Day K. Smith has been appointed General Ticket Agent. His office will be, for the present, at Port Huron, Mich. Mr. Smith was formerly on the Toledo, Peoria & Warsaw.

Wilmingtn & Northern.—The bondholders who bought the Wilmington & Reading road at foreclosure sale met in Philadelphia Jan. 18 and organized a new company under this name by electing Robert Frazer President, with the following directors: Matthew Baird, Edward S. Buckley, Lewis Waln Smith, Dupont, Charles Baber, George Brooke. Mr. Frazer was President of the old company.

Lancaster.—At the annual meeting recently the following directors were chosen: George A. Parker, Jacob Fisher, Lancaster, Mass.; S. H. Howe, Bolton, Mass.; F. W. Warren, Stow, Mass.; C. H. Waters, Clinton, Mass.; W. E. Faulkner, South Acton, Mass.; Amory Maynard, Maynard, Mass.; F. D. Brigham, Hudson, Mass.; Peter B. Brigham, Boston.

South Mountain.—At the annual meeting in Jonestown, Pa., Jan. 8, Wm. H. Bell was chosen President, with the following directors: D. M. Rank, Wm. Lentz, Henry Brobst, Jacob W. Grove, Michael Miller, Henry Cameron, J. H. Ulrich, Simon Heilman, C. S. Maulfair, Elias Stout, Frederick Harner, John H. Lick, John P. Seiler, John H. Speck. The board elected D. M. Rank Vice-President; Jacob Heilman, Secretary; Wm. Lentz, Treasurer.

Chicago, Burlington & Quincy.—Mr. J. Christianity, formerly Master mechanic of the Burlington & Missouri River Railroad, has been appointed Mechanical Engineer at the Aurora shops of the Chicago, Burlington & Quincy—a new office on that road.

Baltimore & Ohio.—The Baltimore City Council has elected the following city directors in this company: Robert T. Banks, John F. Wiley, Joseph B. Stafford, Wm. H. Strauss, Thomas O. Sellers, B. F. Ullman, Wm. A. Boyd. The first three are re-elected; the last four succeed James Boyle, J. A. Henderson, C. E. Waters and J. J. Turner.

Great Western of Canada.—Mr. George B. Spriggs, late of the Baltimore & Ohio, has been appointed General Freight Agent, in place of Mr. John Crampton, resigned.

PERSONAL.

The Hamilton (Ont.) Times of Jan. 16 says: "We regret to learn that Mr. Crampton, Assistant-General Manager and General Freight Agent of the Great Western Railway, is about to sever his connection with that company after a service of over twenty years. His friends both here and in the United States, who are interested in the prosperity of the Great Western Railway, are sorry that he has deemed it advisable to take this step, but trust that he will not remove too far from their midst to be lost sight of."

Mr. Samuel Carpenter, General Eastern Agent of the Pennsylvania Railroad, has been presented by Messrs. Jarrett & Palmer with a souvenir of their fast train to San Francisco, consisting of a book containing engraved copies of the tickets used on that train, enclosed in a solid silver case.

Mr. J. B. Shackelford, for a number of years General Baggage Agent of the Pittsburgh, Cincinnati & St. Louis road, died at his residence in Columbus, O., Jan. 18. He had been in poor health for a year past.

Col. S. L. Fremont, late Chief Engineer and Superintendent of the Carolina Central Railroad, while on a visit to Rocky Mount, N. C., last week, slipped and fell on the ice, breaking one of his legs.

—Mr. James E. Cuthbert has resigned his position as Treasurer of the Atlantic, Mississippi & Ohio Company, and is now Cashier of the Citizens' Bank of Petersburg, Va.

The Governor of Connecticut has nominated Mr. G. W. Woodruff as Railroad Commissioner for another year. The nomination has not been confirmed and probably will not be until the fate of the bill to reorganize the board, which is now before the Legislature, is decided.

The New Hampshire Democrats have nominated Mr. Thomas J. Dinsmore as their candidate for Railroad Commissioner.

—Mr. John R. McPherson, who has just been elected United States Senator from New Jersey, is lessee of the Erie stock-yards at Buffalo, Deposit and Weehawken, and is manager and chief owner of the stock-yards and abattoirs at Communipaw and at Hasbrouck Cove in Jersey City, the freight terminus of the Pennsylvania.

—Mr. Charles Collins, Chief Engineer of the Lake Shore & Michigan Southern, was found dead at his residence in Cleveland, O., on the morning of Jan. 20, under circumstances which left no doubt of the fact that he had committed suicide during the absence of his family, who were away on a short visit. It is believed that his mind had been unsettled by the worry and trouble connected with the Ashtabula accident and the fear that he would be in some way held responsible, although the evidence taken had not thrown the blame upon him. Mr. Collins had been connected with the road for many years (since 1859, we believe), having been Chief Engineer of the Lake Shore before the consolidation, and Chief Engineer of the whole line since Mr. Paine's appointment as General Superintendent. He was considered a very careful, conscientious man, and was remarkable for his great attachment to the road and the pride which he took in its good condition; and the terrible accident resulting from the failure of one of its structures must have been a great affliction to him, even though he could not be held personally responsible therefor.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Year ending Sept. 30:	1875-76.	1874-75.	In. or Dec.	P. c.
Atlantic & Great Western.....	\$3,661,207			
Expenses.....	2,864,630			
Net earnings.....	\$796,577			
Earnings per mile.....	7,293			
Per cent. of exps.....	78.25			
Charlotte, Columbia & Augusta.....	524,562	\$614,014	Dec.	\$80,452 14.8
Expenses.....	321,235	364,000	Dec.	42,774 11.8
Net earnings.....	\$203,327	\$250,005	Dec.	\$46,678 16.7
Earnings per mile.....	2,690	3,149	Dec.	459 14.6
Per cent. of exps.....	61.27	59.28	Dec.	1.99 3.4
Year ending Oct. 31:				
Westchester & Philadelphia.....	\$369,544	\$347,459	Inc.	\$22,086 6.3
Expenses.....	20,575	194,851	Inc.	6,724 3.4
Net earnings.....	\$167,969	\$152,608	Inc.	\$15,361 10.1
Earnings per mile.....	10,410	9,788	Inc.	622 6.3
Per cent. of exps.....	54.48	56.08	Dec.	1.60 2.9
Year ending Nov. 30:				
Portland & Ogdensburg.....	\$234,979	\$226,150	Inc.	\$8,829 3.9
Expenses.....	145,160	122,103	Inc.	23,057 19.0
Net earnings.....	\$89,819	\$104,047	Dec.	\$14,228 14.4
Earnings per mile.....	2,513	2,661	Dec.	148 5.8
Per cent. of exps.....	61.77	53.99	Inc.	7.78 14.4
Year ending Dec. 31:				
Cairo & St. Louis.....	\$263,068	\$282,385	Dec.	\$19,317 6.8
Central, of N. Jersey.....	7,322,000	7,411,637	Dec.	\$89,637 1.3
Expenses.....	3,684,000	4,128,727	Dec.	444,727 10.8
Net earnings.....	\$3,638,000	\$3,282,910	Inc.	\$355,000 10.8
Earnings per mile.....	21,285	20,581	Dec.	55.71
Per cent. of exps.....	56.31	55.71	Dec.	5.40 9.7
Month of December:				
Cairo & St. Louis.....	\$16,567	\$28,047	Dec.	\$11,160 39.9
Nashville, Chattanooga & St. Louis.....	139,237	164,513	Dec.	25,376 15.4
Expenses.....	84,328	96,131	Dec.	11,803 12.3
Net earnings.....	\$54,900	\$68,389	Dec.	\$13,473 19.7
Per cent. of exps.....	69.58	68.44	Inc.	2.14 2.7
Nashville, Chattanooga & St. Louis, & St. Louis, Iron Mt. & Southern.....	1,697,917	1,638,771	Inc.	59,146 3.6
Expenses.....	912,518	1,006,649	Inc.	97,292 9.7
Six months ending Dec. 31:				
St. Joseph & Denver City.....	\$277,003	\$264,180	Inc.	\$12,823 4.9
Month of December:				
Cairo & St. Louis.....	\$16,567	\$28,047	Dec.	\$11,160 39.

gions, and that the reduction is necessary to enable them to retain their trade under the sharp competition of the Clearfield coals and the low prices of anthracite.

Grain Movement.

From Jan. 1 to 13 the total receipts of grain of all kinds at Atlantic ports were 2,958,516 bushels in 1876, against 3,570,242 in 1875, showing a decrease of 17 per cent. Of the total receipts this year, 31½ per cent. went to New York, 28½ per cent. to Baltimore, 24 per cent. to Philadelphia, and 12 per cent. to Boston.

For the first half of the California crop year, from July 1 to Dec. 31, San Francisco wheat exports were as follows:

	1876.	1875.	Increase. P.c.
Flour, barrels	266,500	232,300	64,200 27.6
Wheat, bushels	13,422,000	6,993,334	6,428,666 91.9
Total bushels	14,904,500	8,154,834	6,749,666 82.8

There is some difference of statement as to the surplus still remaining for export; the most general opinion seems to be that nearly three-quarters of the surplus has been exported, leaving only about one-quarter still in the State.

Railroad Traffic.

The passenger movement at San Francisco for the past year was as follows:

	By sea.	By rail.	Total, 1876.	Total, 1875.
Arrived	26,804	60,565	86,369	106,700
Departed	13,369	37,636	51,006	49,200
Total	39,173	98,201	137,374	151,900

Of the arrivals by sea 16,085 were from China and Japan, and only 4,581 from the East by way of Panama.

The freight traffic at the Utah Central and Utah Southern roads for the year ending Dec. 31 was as follows:

	1876.	1875.	Increase. P.c.
Utah Central, tons	138,820	119,174	19,646 16.5
Tah Southern	96,775	71,443	25,332 35.8
Total	235,595	190,617	44,978 23.6

The leading item on the Central was 60,393 tons of coal and coke; on the Southern 35,861 tons ore and bullion. The Southern also carried 8,156 tons iron ore and 407 tons copper ore and mott.

Prices.

The *Engineering and Mining Journal* reports a sale of 1,000 tons of steel rails, said to be at \$49.50 at tide-water, with 12 months' interest. It says: "There is a very fair inquiry for rails, and indications that a large business will be done in steel rails at least. We quote iron rails at mills at \$34 to \$36, and steel at \$46 to \$54." No. 1 foundry pig is quoted at \$21 per ton in New York, No. 2 at \$19 to \$20, and forge at \$18.50 to \$19.

Rails continue to fall in price in Europe. On the 6th of December last bids were opened in Belgium for a lot of steel rails, and the John Cockerill Company bid \$34.30 gold per ton for 1,400 tons, to be delivered in December, and \$33.80 for 1,000 tons to be delivered by August, 1877. In England, a few days before, a contract for 6,000 tons to go to India was let at £7 per ton—\$34.00 gold.

THE SCRAP HEAP.

Railroad Manufactures.

Thomas W. Godwin & Co., of Norfolk, Va., have recently completed a locomotive with 8 by 16 in. cylinders and 30 in. drivers for a lumber road in Norfolk County.

The King Iron Bridge Co., of Cleveland, O., has elected Zenas King President; James A. King, Vice-President; H. B. Gibbs, Secretary. There are a number of bridges under construction in the shops, but outside work has been much delayed by severe weather and the difficulty of getting masonry completed.

The Cleveland (O.) Rolling Mill Co. has re-elected A. B. Stone President; H. Chisholm, Vice-President and General Manager; E. S. Page, Secretary.

The blast furnace at Kutztown, Pa., is to be started up this month by the Hematite Iron Co., of Allentown.

The Cleveland (O.) Bridge & Car Works are building several street cars for Kingston, Ont.

During the week ending Jan. 13 the Edgar Thomson Steel Works, in 5½ days' run, turned out 1,200 tons, 1,570 lbs. steel rails, 56 lbs. to the yard, the number of rails being 4,759.

Klein, Logan & Co., of Pittsburgh, manufacturers of picks, sledges and other contractors' tools, have an order from Tiflis in Asiatic Russia, near the Persian border.

On Jan. 13 the American Bridge Co. gave a dinner to its workmen employed in the erection of the Point Bridge at Pittsburgh, and to a number of invited guests. The occasion was the successful completion of the work of placing the main chains which are to carry the bridge. Mr. Edward Hemberle, Engineer of the Bridge Company, made an address, and after dinner speeches were made by several of the guests.

Bowers, Dure & Co., at Wilmington, Del., are building 50 construction cars and have a good deal of repair work on passenger and sleeping coaches.

The Vulcan Iron Works, at St. Louis, have an order for light rails for 20 miles of the Tyler Tap Railroad in Texas.

The Litchfield (Ill.) Car Co. is building a number of cars for the Tyler Tap Railroad.

A shop for the manufacture of cars is to be established in Tyler, Tex. Only freight cars will be built at first.

W. H. Baily & Co., at Connellsville, Pa., are building an engine for the Tyler Tap Railroad and have several others under way.

How Railroad Employees are Treated in Germany.

An English railroad man in Germany has written the following, which is published in the *Railway Service Gazette*:

"It would be a lesson, and a beneficial one, to our stingy directors at home if they came here and saw the kindness and care which the Prussian Government have for the servants employed on the State railways.

In the workshops all the men are allowed to smoke as often and as much as they please. In going round one workshop, a kind-hearted German fitter took a bottle out of his pocket and offered me an 'international' drink. Of course (being no spirit-drinker), I politely declined the offer with many 'danks,' and we shook hands instead. To-day I saw a number-taker wearing an excellent suit of military clothing, with cap, and splendid top-coat. All the guards wear magnificent overcoats, which they can raise up so as to protect their necks and heads. The engine-drivers are equally well supplied with clothing.

"The whole of the staff connected with outdoor work have blue uniform suits. Porters, clerks, station-masters, and all connected with the stations, are similarly dressed in blue uniforms, with trimmings varying with the grade. As yet I have not been able to ascertain the wages paid to the running and out-door staff, but will try to do so for you.

"The fitters receive about £1 a week, which buys much more than a like sum does at home."

Paying Enginemen by Mileage.

The system of paying enginemen by the mileage run may sometimes result badly for the men, as is shown by the following from the Rochester *Union*:

"The engineers on the New York Central & Hudson River Railroad are in some danger of having a small amount of money for this month's labor next pay day. They made a proposition to the company to receive pay for only as many

miles as they traveled, and the company accepted the offer. This arrangement was satisfactory enough, under ordinary circumstances, but the men did not calculate that the road would ever be in such a condition as it is now, and as a consequence they regard the snow drifts along the line with anything but love. If such winters as the present are to continue in this locality the men will probably move a reconsideration of the vote by which the arrangement with the company was adopted."

RAILROAD LAW.

Government Transportation on Land Grant Roads.

A Washington dispatch of Jan. 15 says: "The Supreme Court to-day decided that land-grant railroads are not bound to transport the troops and property of the United States free of charge, by reason of that fact; that they are only to allow the Government the free use of their tracks in return for the grants, and that they are each entitled to compensation for all such transportation they have performed, excepting the carrying of the mails, subject to a fair deduction for the use of their several roads. The general course of legislation on the subject of railroads is reviewed at length, and the conclusion is that it demonstrates the fact that in the early history of railroads it was very generally supposed that they could be public highways in fact as well as in name. In view of this fact it is thought that the conclusion not to be remitted, when construing a legislative declaration to the effect that a particular railroad shall be a public highway, that the meaning is that it shall be open to the use of the public with their own vehicles; and that when Congress, in granting lands in aid of such a road, declared that it should be and remain a public highway for the use of the Government, it only meant that the Government should have the right to use the road but not that it should have the right to require its transportation to be performed by the railroad company, and that when the right to use the road is granted, 'free from all toll or other charge for the transportation of any property or troops of the United States,' it only means that the Government shall not be subject to any toll for such use of the road. This decision is in the case of the Lake Superior & Mississippi, and the Atchison, Topeka & Santa Fe Railroad companies, which have been some time under advisement. This reverses the judgment of the Court of Claims. Justice Bradley delivered the opinion. Dissenting: Justices Clifford, Miller, Davis and Swayne; Justice Miller writing the opinion."

OLD AND NEW ROADS.

The Massachusetts Company.

The latest proposition for the disposal of the Hoosac Tunnel is to organize a new company, to be known as the Massachusetts Company, under a special charter, and with an ample capital. This company is to lease the Fitchburg road, lease the State road, or pay tolls for its use, and to build a new line from the western end of the tunnel by way of Schenectady and Rome, N. Y., where it will connect with the Rome, Watertown & Ogdensburg road and the Erie Canal. The project also includes a branch to connect with the anthracite region of Pennsylvania, and a connection with the Tioga coal region by the Utica, Ithaca & Elmira road.

Canadian Pacific.

The track on this road at latest advices was laid for 35 miles from the eastern terminus at Fort William on the Kaministiquia River, two miles from its mouth in Thunder Bay. At Fort William a wharf has been completed and a substantial stone round-house, repair shop, store-houses and other buildings are in progress, including dwellings for the railroad staff. A branch line has been located about four miles long to Prince Arthur's Landing, a flourishing mining settlement and the largest town in that region.

The line from Fort William to the Red River is now all under contract, the last section, No. 15, having been let to Sutton & Thomson. Several of the contractors are old Intercolonial men, having built sections of that line.

Cincinnati, Hamilton & Dayton.

Messrs. Winslow, Lamier & Co., New York, give notice that the 8 per cent. bonds of this company due June, 1877, will be paid in cash on presentation at their office, or will be received at par and accrued interest in payment for the company's new consolidated bonds at 95.

Texas & Pacific.

A contract for the grading of the extension from Fort Worth, Tex., west to Weatherford has been let to Leavitt & Rowe, the work to be done by July next.

Meetings.

The following companies will hold meetings at the times and places given:

Eastern, annual, at the Meionaon in Boston, Feb. 5, at 11 a.m.

Boston, Clinton, Fitchburg & New Bedford, annual, at South Framingham, Mass., Feb. 6.

St. Louis, Kansas City & Northern, annual, at the company's office in St. Louis, March 6, at 11 a.m.

San Diego & Yuma.

The people of San Diego, Cal., are afraid that their interests will suffer from the compromise between the Texas & Pacific and the Southern Pacific, and they propose to organize a company and build a road of their own from San Diego by the most direct route to Fort Yuma. They will also ask for the same subsidy or guarantee as Congress may decide to give to the main line.

Atlantic & Great Western.

The following statement for the year ending Sept. 30, 1876, is published in London by the reconstruction committee:

Gross earnings	\$3,661,206 84
Working expenses (78.25 per cent.)	2,864,629 67

Net earnings	\$796,577 17
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Rentals, interest, etc.	721,406 01
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Surplus	\$75,171 16
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On application of James McHenry and other stockholders a meeting has been called to elect a new board of directors. Mr. McHenry is reported as saying that he intends to exercise all the powers which his securities give him and to elect a board to suit himself.

The Trustees of the reconstruction committee, learning that a requisition had been presented to the officers of the company on behalf of James McHenry and others desiring a meeting for the election of a new board of directors, and that in accordance with this requisition such an election will be held Feb. 15 next, addressed a letter to Mr. McHenry in which they protest, on behalf of the company's creditors who have deposited their securities with them, against this proposed action of the stockholders "as practically a breach of faith with the creditors." They add: "As regards yourself personally, as one of the originators of the scheme of arrangement, we feel that is hardly necessary to point out that the one essential element of the scheme was to give the practical control of the line to the creditors on certain terms of mutual concession and arrangement, and that this independent action on your part (which you commenced

last year, but after consideration advisedly relinquished) is under the circumstances not a fair and proper step as regards the creditors, who have such vast interests at stake." They asked Mr. McHenry, since the election must now be held, unless enjoined by a court, to place his proxies at their disposal, and offered to confer with him concerning changes in the board.

Mr. McHenry replied that he and others "intend to exercise the powers which we properly hold, in order to elect a board capable of protecting the interests of the creditors." He says that they, the reorganization trustees, cannot interfere with the company's affairs until a foreclosure; that the directors have now no executive power, "nor any other power than the interests of the creditors to support the scheme of reorganization." He adds: "I do not intend to relax my grip on the affairs of either one company or the other until I have justified before the public the several issues of bonds for which I am more or less responsible."

Cincinnati Southern.

A bill has been introduced in the Ohio Legislature providing for the leasing of this road. It authorizes the trustees, after advertising for three months, to lease the road to the parties making the bid most advantageous to the city of Cincinnati, provided they are responsible and have the necessary means to operate the road properly.

Another disposition is suggested by a wicked Cincinnati paper, which does not seem to have as much faith therein as formerly. The trustees having applied to the Court for additional compensation for their services, this paper suggests that the road itself be given them as an installment, and perhaps when the times improve and people are better able to pay their taxes they may be paid the rest of their compensation in money.

Dividends.

Dividends have been declared by the following companies: Mill Creek and Minehill, 5 per cent., payable on demand. Mt. Carbon & Port Carbon, 5½ per cent., payable on demand.

Sohulykill Valley, 2½ per cent., payable on demand. Shenango & Allegheny, 10 per cent., from the earnings of the past year.

Ohio & Mississippi.

The Receivers publish the following notice: "Parties holding claims against the Ohio & Mississippi Railway Company, founded on accounts which accrued during four months prior to Nov. 18, 1876, are advised that the Receivers can assume no discretion in respect of their payments. Such accounts should be presented to Hon. W. L. Gresham, Judge of the United States Circuit Court for the District of Indiana, at Indianapolis, Ind., for his order in relation thereto."

The Receivers, Messrs. King and Torrance, have filed an inventory of all the property in their possession with the United States Circuit Court in Indianapolis. They also report that their receipts from Nov. 18 to Dec. 31 were \$545,969.72, and that they have paid all amounts due for labor at the time of their appointment. It is understood that they will ask the Court for authority to pay 25 per cent. on the outstanding bills and claims for supplies furnished.

In the United States Circuit Court in Indianapolis, Jan. 19, Allan Campbell, surviving trustee under the first and second mortgages, died a petition for the removal of Daniel Torrance from the receivership. His petition charged mismanagement by Mr. Torrance and incompetency for the position. At the same time Wm. D. F. Manics, a stockholder, filed a petition for the removal of both Messrs. Torrance and King, his petition also alleging mismanagement and specifying several acts, chiefly the purchase of the Springfield Division. It also alleges that the bankruptcy proceedings, under which the present Receivers were appointed, were secret, without proper notice to those interested, and charges that the intention is to deprive stockholders of their interest.

The Court took the petitions and appointed Jan. 25 as the day for hearing argument thereon.

The Welland Canal Improvement.

The Buffalo Commercial Advertiser says: "The Welland Canal improvement is being pushed forward with considerable energy by the Canadian authorities. The masonry was advanced a good deal further during the past summer than was anticipated last spring. It is in the opinion of those employed on the work that all the masonry will be completed between sections 1 and 12, inclusive, next summer. All the locks, bridges, etc., are in progress at present. Belder & Co.'s masonry on sections 2 and 3 is about finished, and if it is the wish they will complete it early next summer. Campbell & Co. have pushed the work on the bridge on section 4 with great rapidity of late. Peterson, on section 5, has also done well. He will finish his two locks next summer. The swing bridge on No. 6 will be completed early in the season. Blake's work on No. 5 is well along. The three locks on Nos. 8 and 9 are about finished. The same may be said of Nos. 10 and 11. The two locks on No. 12 are well advanced. The Great Western Railway tunnel, which will take about 30,000 yards of masonry, was started this fall, and has been advanced with wonderful rapidity to the fourth course, the full length of the tunnel. The contractors, Lobb & Co., intend dressing stone all winter on Point Pelee Island, Lake Erie. About 35 cutters will be kept employed. They have some very fine quarries there. The stone is almost on the surface, and the quality very soft. They will cut the sheeting stone there this winter, and boat it down the lake next spring to Port Colborne, thence through the Welland Canal to the tunnel. Reports from the island state that the ice is rough and tough enough there. Osborn & Co., the contractors on section 13, commenced the two locks of this section late last summer. One has the seventh course on, and the other has one. On sections 14, 15 and 16, John Brown, contractor, the work is well advanced. On the old canal a great deal of dredging has been going on all summer, but it will require two or three summers more to complete the work of widening and deepening the old cut to correspond with the new. At present all the masons and cutters, except a few, are suspended till the voice of spring comes to summon them to wield their hammers and swing their picks once more. The reason of this early suspension is the fear that the frost will split the stone."

Sunbury & Lewistown.

The accounts having been audited and completely settled, the Treasurer is now ready to distribute among bondholders the very small balance remaining for them. The Treasurer is Mr. J. Hart, of Doylestown, Pa.

Southwestern & Rio Grande.

A vote is to be taken in Shreveport, La., on the question of voting \$300,000 aid to this company, \$150,000 for the line from Shreveport to Logansport on the Texas line, \$150,000 for that from Shreveport northeast to the Arkansas line.

Maryland & Delaware.

In the United States Circuit Court some of the bondholders have brought suit to foreclose the first mortgage on this road, and ask for the appointment of a receiver. The road extends from Clayton, Del., southwest to Easton, Md., 44 miles. The interest

bonds, and it was resolved that each of the subscribing bondholders shall receive the face value of his bonds in new stock.

The bondholders met in Philadelphia, Jan. 23, and received the report of the committee, which was adopted. After some discussion it was resolved to admit to the new corporation, until Feb. 24, bondholders who did not sign the agreement to purchase the road, provided they can show that their failure to sign resulted from ignorance of the existence of the agreement.

Harrisburg & Potomac.

The contract for grading the Petersburg Branch has been let to Cyrus Diller, of Hanover, Pa., who has a small force employed on the work.

Cumberland Valley.

There is considerable agitation in favor of the proposed extension of this company's leased Martinsburg & Potomac road to Winchester, Va. At several meetings resolutions have been passed in favor of county subscriptions of \$10,000 per mile. The distance is about 23 miles.

Marietta & North Georgia.

This company asks the Georgia Legislature for a grant of \$5,000 per mile to buy iron for the road, a large part of which is graded. The necessary bill has been introduced and has many advocates. The road is to run from Marietta, Ga., north by east to Murphy, N. C., about 95 miles, where it will connect with the Western North Carolina Railroad, when that road is completed. It will pass through a section of Georgia especially rich in minerals, but not thickly peopled.

Junction & Breakwater.

It is stated that repair shops of sufficient size to do all the work for this road, the Breakwater & Frankford and the Worcester roads, are to be built at Georgetown, Del.

Mohave & Inyo.

A project is on foot to build a railroad from the Southern Pacific at Mohave, Cal., to the mining regions of Inyo County, a distance of about 100 miles, in a northeasterly direction.

Chicago, Milwaukee & St. Paul.

The shipments of freight from Chicago over this road for two years have been, in tons:

	1876.	1875.	Increase.	P. c.
Shipments	139,580	124,288	14,342	11.6

Chicago is a much less important point than Milwaukee on this road, but this is true of receipts much more than of shipments.

Swainsboro Branch.

It is proposed to build a branch from the Central Railroad of Georgia near Sebastopol southward to Swainsboro, about 17 miles, provided the people on the line will raise a reasonable amount. A part of the distance is covered by a lumber track built some time since by Wadley & Co., the work on which could be utilized for the branch.

Montana.

Montana papers state that a new proposition is to be submitted to the Territorial Legislature for the construction of a railroad having its northern terminus in the Beaverhead or the Jefferson Valley and connecting with the Union Pacific directly or through the Utah Northern, most probably the latter. Mr. Royal M. Bassett, who is largely interested in the Utah line, represents the parties making the proposition, and among those parties are several large owners of Union Pacific stock.

Keokuk & Des Moines.

This company's proposed new bridge and depot at Des Moines, Ia., are strongly opposed by the Des Moines & Fort Dodge Company, which owns the bridge and depot now in use and desires to compel the other company either to continue their use or to buy them. Quite an active contest is in progress, which will probably end in a law suit.

Southern Pacific.

A large force is now employed in the erection of machine and car shops in Los Angeles, Cal. Most of the tracklaying force has been transferred to Indian Wells, and the work of extending the track towards Fort Yuma has been resumed.

Central Pacific.

California papers state that the Railroad Commissioners of that State have begun suit against the Central Pacific Company for failure to comply with the law requiring companies to file with the Secretary of State and the clerks of counties through which the road passes copies of their freight tariffs and rates of fare for passengers.

Virginia Railroad Commission.

A bill is now before the Legislature of Virginia providing for the establishment of a board of three railroad commissioners to have a general supervision of the railroads of the State. They are also to have power to collect statistics and to receive annual reports from the companies, present them to the Legislature and make such recommendations as may seem necessary. There is much opposition to the bill.

Maryland Railroad Taxation.

The Baltimore *Gazette* says: "A deputation of the boards of the several counties through which the large railroad lines run, met in Annapolis Jan. 3, and continued their session until today, with a view to an equalization of the assessment of the road-beds of such railroads. The meeting adopted, for the minimum valuation of the lands occupied by the road-beds of the Baltimore & Ohio, the Northern Central, the Philadelphia, Wilmington & Baltimore, and the Washington Branch of the Baltimore & Potomac Railroad, the price of \$40 per acre, to be increased in the counties, if the adjacent lands are rated higher, according to the value of the adjacent lands. They also established the following rates for the assessment of the road-beds and appurtenances: Baltimore & Ohio, \$12,500 per mile; Metropolitan Branch, \$7,500 per mile; Philadelphia, Wilmington & Baltimore, \$12,500 per mile; Northern Central, \$12,500 per mile; Baltimore & Potomac, \$7,500 per mile; Pope's Creek Line, \$4,000 per mile; Cumberland & Pennsylvania, \$7,500; Eckhart Branch, \$6,000; Washington County Railroad, \$3,000; Pittsburgh & Connellsville, \$7,500; Annapolis & Elkridge, \$3,000; Union Railroad at \$6,000; and Frederick & Pennsylvania, \$6,000 per mile. Sidings to be assessed at \$2,500 per mile, and yard tracks at \$5,000 per mile."

Western North Carolina.

A select committee of the North Carolina Legislature has been investigating the affairs of this road and has presented a report which is thus summed up by the Raleigh *News*: "Find the work progressing tolerably well, but that the convicts are not properly managed, and that the labor is not made as useful as it might be. They find it the most governed railroad in the country; and that it has been run by the present commissioners as a personal charity. The report recommends an appropriation to buy iron for the railroad and suggests that steel rails be laid on the new portion. The committee think that by proper management of the work and convicts, the road can be finished to Asheville by Jan. 1, 1878. The committee also submitted a number of valuable propositions in connection with the management and operation of the road."

Erie.

In the suit against this company in the New York Supreme Court, Jan. 20, a motion was made for an order to reimburse

the Farmers' Loan & Trust Company, trustee, for the expenses incurred by it during the suit. A motion was also made for an order to fix the salary or compensation of the Receiver. Both motions were referred to James C. Spencer as Referee.

The Farmers' Loan & Trust Company, of New York, has been appointed Agent in New York for the Reconstruction Trustees in London. Bond and stockholders are requested to present their securities for adjustment under the amended plan of reconstruction at its office in New York as soon as possible.

Denver & Rio Grande.

The operations of the Main Line, 120 miles, for November are reported as follows:

Freight earnings.....	\$20,978 76
Passengers.....	10,147 25
Miscellaneous.....	75 00
Total (\$259 per mile).....	\$31,101 01
Expenses (53.03 per cent.).....	19,605 63

Net earnings (\$96 per mile)..... \$11,495 38

As compared with November, 1875, there is an increase of \$853.25, or 2.8 per cent. in gross, and of \$107.36, or 1 per cent., in net earnings. The Government business for the month amounted to \$1,276.09. The net earnings may be increased hereafter by whatever the referee may award as this company's proportion of competitive earnings.

Alabama & Chattanooga.

This road was sold in Mobile, Ala., Jan. 22, and was bought by Judge Grandin, of Mobile, for account of the holders of Receivers' certificates. The sale was under an order of the United States Circuit Court to satisfy the Receivers' debts, which the bondholders failed to pay.

Tennessee & Pacific.

On Jan. 16 this road was transferred to the Nashville, Chattanooga & St. Louis Company, which has bought the stock held by Davidson and Wilson counties and also nearly all of the small amount of stock held by individuals, and will work the road as a branch, with the same officers as the Main Line. The new owners have already begun work on many needed improvements and will put the road in good order, as it has been heretofore in very poor condition. The road extends from Nashville, Tenn., east by north to Lebanon, 31 miles.

Hanover Junction, Hanover & Gettysburg.

The board has directed a survey to be made from East Berlin, Pa., the terminus of the East Berlin Branch, westward to Deardorff's Mill, on the York Springs road. Mr. J. S. Gitt is to make the survey.

Hanover & York.

At the annual meeting in Hanover, Pa., Jan. 8, the President reported that the stock outstanding was \$207,200; bonds, \$150,000, and floating debt, \$37,400. The gross earnings as reported by the lessee, the Pennsylvania Railroad Company, for 11 months ending Nov. 30 were \$55,400.36; expenses, \$39,144.12; and net earnings, \$16,256.24. The road has been improved and is now in good condition. After settling with the lessees, deducting betterments, etc., and paying the coupons due Jan. 1, there remains a balance of \$6,009.14 to be applied to the floating debt. The lessee reports that the net earnings of the Littlestown Railroad, in which this company holds a controlling interest, and which is also worked by the Pennsylvania, were absorbed in necessary repairs. The interest on the \$40,000 bonds of the Littlestown Company, which became due Dec. 1, was not paid and the coupons went to protest.

Central, of New Jersey.

The following statement for the year 1876 has been published, the month of December being estimated:

Gross earnings (\$21,295 per mile).....	\$7,322,000
Expenses (50.31 per cent.).....	3,684,000
Net earnings (\$10,576 per mile).....	\$3,638,000

Interest, taxes and rentals..... \$3,167,000

Surplus..... \$471,000

As compared with 1875 there is a decrease of \$89,637, or 1.2 per cent., in gross earnings, and an increase of \$355,090, or 10.8 per cent., in net earnings.

Reports come from the Philadelphia Stock Exchange of serious trouble with the Lehigh Coal & Navigation Company as to settlement of the amounts due that company for rental of the Lehigh & Susquehanna Railroad and the canals.

Houston & Texas Central.

The following statement for the year 1876 is published by the Commercial and Financial Chronicle:

Gross earnings (\$6,262 per mile).....	\$3,162,518 22
Expenses (59.60 per cent.).....	1,886,196 99

Net earnings (\$2,529 per mile)..... \$1,277,321 33

As compared with 1875 the net earnings show an increase of \$133,385.68, or 11.7 per cent. The interest on the bonded debt was \$950,000, leaving a surplus of \$327,321.33. During the year the company changed the gauge of 120 miles of the main line from 5 ft. 6 in. to 4 ft. 8 1/2 in., and added 8 engines and 200 freight cars to the equipment.

North Landing.

Messrs. Baird & Roper are constructing and have nearly completed a railroad from North Landing, in Norfolk County, Va., to Mount Pleasant, a distance of seven miles. It is equipped with one locomotive and several cars, and is a private road, intended to carry lumber.

Central, of Iowa.

Hassler's Circular says: "It will be remembered that Mr. Cowdry appealed from the decree of sale entered by Judge Dillon in October, 1875, and it was Mr. Cowdry's intention that the appeal should act as a stay of all proceedings until it could be heard before the full bench of the Supreme Court at Washington. But, on motion to dismiss the appeal, the Chief Justice has delivered the opinion of the Court dismissing the appeal so far as it may act as a stay of proceedings.

Judge Dillon has now ordered the sale of the property, and it seems quite certain that the wishes of the majority of the bondholders, as heretofore expressed, will be fully carried out."

Rochester & State Line.

Mr. Henry A. Taylor, the contractor, reports to the Rochester City Council that the track has been extended to Pearl Creek, 10 miles from LeRoy. The masonry and grading are all completed to Gainesville. The fencing is complete to LeRoy. All the bridges are under contract for immediate completion. Iron enough to lay track to Gainesville is at LeRoy. Two new locomotives, 30 box cars and 30 flat cars have been added to the rolling stock. The masonry is being pushed forward on the Salamanca Division as fast as possible. The work, however, has been delayed by the trouble with the Erie about the crossing at LeRoy and also by the severe weather and unusually deep snow. In view of all this, Mr. Taylor asks the Council to adopt such resolutions as will protect him and the sureties on the guarantees given to the City of Rochester, for a reasonable time after July 1, if he is unable to complete the road by that time.

Philadelphia, Wilmington & Baltimore.

The Baltimore *Gazette* says: "The suit of the State of Maryland by its counsel, John H. Handy, vs. the Philadelphia, Wilmington & Baltimore Railroad, to recover one-half of one per cent. tax upon the gross receipts of the company for its entire

line for two years, aggregating with interest about \$25,000, will, it is understood, be settled on the basis laid down in the opinion of the Court of Appeals of this State, filed in April, 1876. The cases were instituted in the Superior Court, and under a *pro forma* judgment in favor of defendants, on a statement of facts, were taken up to the Court of Appeals. The latter tribunal decided that the company was liable to taxation for the gross receipts on that part of the road from Baltimore to the Susquehanna River (being that portion formerly known as the Baltimore & Port Deposit Railroad), as also for its stationary property, track, etc., to the Delaware line. The amount of the judgment will be fully one-third of the sum claimed as tax upon the entire line, in the proportion of 37 miles from this city to the Susquehanna, to 98 miles from Baltimore to Philadelphia."

St. Paul & Pacific.

A bill has been introduced in the Minnesota Legislature providing for an extension of five years in the time for the completion of the St. Vincent Extension. The bill also provides for the repeal of the act of 1874, which provided for the relief of the contractors who furnished labor and materials for the extension of the road, and which has been decided to be unconstitutional.

Louisville & Nashville.

This company is considering the question of extending its Knoxville Branch from Livingston, Ky., south by west to Barberville in Knox County, about 35 miles. It is said that the extension will be built if Laurel and Knox counties will raise a satisfactory amount of aid.

The Louisville Extension of the Louisville, Paducah & Southwestern road was formally transferred to this company Jan. 16. As heretofore noted, this line is 46 miles long, from Cecilian Junction, Ky., to Louisville, and by using the six miles of the main line of the Paducah road from Cecilian Junction to Elizabethtown it forms a loop line 52 miles long from Elizabethtown to Louisville. This is 10 miles longer than the Louisville & Nashville, but is said to have better grades. The extension has been owned by the bondholders, who bought it at foreclosure sale last August, it having been sold separately from the main line. The Louisville & Nashville Company agrees to give the Paducah road full facilities for all of its Louisville business.

The addition of this 46 miles makes the total mileage worked by the Louisville & Nashville Company 957 miles.

St. Louis & Kansas Southern.

Arrangements have been made to organize a company by this name to build a narrow-gauge railroad from Oswego, Kan., to the junction of the Missouri, Kansas & Texas and the Missouri & Western roads, westward through Labette, Montgomery, Chautauqua and Cowley counties to Winfield, 120 miles. The proposed line is parallel to and about 20 miles north of the line between Kansas and the Indian Territory.

Nashville, Chattanooga & St. Louis.

The report for the six months ending Dec. 31, the first half of the fiscal year, is as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Gross earnings.....	\$821,281 76	\$874,962 64	Dec. \$53,680 88	6.1
Expenses.....	512,262 13	494,824 65	Inc. 17,437 48	3.5

Net earnings..... \$309,019 63 \$880,137 99 Dec. \$71,118 36 18.7

Per cent. of expenses..... 62.37 56.55 Inc. 5.82 10.3

The earnings this year were \$2,408 gross and \$906 net per mile. The increase in expenses was due to increase in cost of maintenance of way.

Amsterdam Prices of American Securities.

The following were the quotations Dec. 30 on the Amsterdam Exchange for some of the securities largely held there:

U. S. 4 1/2s of 1876	82
Chicago & Northwestern consols 7s.	83 1/4
Michigan, Clinton & Springfield 7s.	97 1/2
Chicago & Western 6s.	97 1/2
Union Pacific, Southern Branch 6s.	49 1/2
Missouri, Kansas & Texas 7s.	49 1/2
do. income bonds.	19
Atlantic & Great Western 7s.	70
St. Paul & Pacific, 1st section, 7s.	39
do. 2d section, 7s.	28

has made no dividends for some time, of course the stockholders of the New Hampshire company have received nothing.

On behalf of the Eastern Railroad Company of Massachusetts a motion has been made to remove the case from the New Hampshire Supreme Court to the United States Circuit Court.

Central Vermont.

The petition of this company for an order to sell the Vermont Central and Vermont & Canada roads to pay the floating debt came up before the Vermont Chancery Court Jan. 18. Counsel for the Vermont & Canada Company, the second-mortgage bondholders, the guaranteed bondholders and some other parties appeared in opposition. But little was done beyond filing the necessary petitions and answers, and the Chancellor adjourned the hearing until the April term, the petitioners to have all their testimony filed by March 15, and rebutting testimony to be all filed by April 10.

Wheeling, Pittsburgh & Baltimore.

The sale of this road was to take place Jan. 18 under a decree of the United States Circuit Court in an action brought by the contractors who built the road, but, after several bids had been received, it was postponed to Feb. 2, in Pittsburgh.

Portland & Rochester.

The application for the appointment of a receiver came up in the Maine Supreme Court Jan. 18 and after hearing testimony and arguments the Court reserved its decision. As all parties in the suit have united in requesting the appointment of George P. Westcott, President of the company, it is expected that the Court will grant the motion and appoint Mr. Westcott Receiver.

Chicago, Danville & Vincennes.

John D. Howland, Master in Chancery, gives notice that he will sell in Indianapolis, Feb. 9, the Indiana Division of this road, including 23.13 miles completed track, about 43 miles of partly completed road and all the equipment and appurtenances. The terms of sale will be one-quarter cash, one-half the remainder in three months and the balance in six months.

Marietta, Pittsburgh & Cleveland.

On Jan. 18 a tunnel near Newcomerstown, O., on this road caved in unexpectedly. Five trackmen, who were in the tunnel at the time, are believed to have been killed by the cave or shut up and subsequently suffocated.

New York Central & Hudson River.

The great snow blockade was broken at last, after a large expenditure of labor and money, last week, and freight trains have been running regularly since Jan. 19. An immense amount of freight has been forwarded since, much of which had been kept back from one to two weeks by the snow. The long delay to stock trains came near causing a temporary scarcity of meat in Boston and other New England towns, nearly all of whose supply comes by this road.

Waynesburg & Washington.

At the annual meeting recently the stockholders voted to authorize an issue of mortgage bonds for the purpose of completing the road, most of which is graded. The road is to run from Waynesburg, in Greene County, Pa., northward to Washington, about 24 miles.

Chicago, Dubuque & Minnesota.

At the bondholders' meeting in Boston, Jan. 17, it was resolved that it was not expedient for them to exchange their bonds for stock, as proposed by the trustees. A committee was appointed to prepare a plan of reorganization and to take such steps as may be necessary to secure the interests of the bondholders.

Brattleboro & Whitehall.

At a meeting held in Brattleboro, Vt., Jan. 16, Mr. B. D. Harris, the principal promoter of this project, reported that the preliminary survey had been completed. The distance was 87½ miles and the estimated cost \$1,389,000, or about \$15,000 per mile. The line, if extended to Boston from Brattleboro on the old Crocker line, would be the shortest road from Lake Champlain to the seaboard. A number of subscriptions were promised and committees appointed to canvass along the line. The meeting adjourned until Feb. 1, when the company will probably be organized.

Gulf, Western Texas & Pacific.

The sale of this road has been postponed for three months on account of an inaccuracy in advertising, and will take place some time in March.

Tyler Tap.

There are now 50 miles of this road graded, 45 miles of which have been accepted. Contracts have been made with the Vulcan Iron Works, of St. Louis, for the rails, with W. H. Baily & Co., of Connellsburg, Pa., for an engine, and with the Litchfield (Ill.) Car Company for number of cars. The company has bought the ties for a section of 20 miles from Tyler, Tex., and track will be laid as soon as the rails are received. The money thus far has been raised from local stock subscriptions, but the company intends, as soon as the first 20 miles are completed, to execute a mortgage for \$5,000 per mile, and to issue bonds with the proceeds of which it is believed that the road can be completed to Mt. Pleasant.

New London Northern.

In the case of Dawson, Tunk & Co., contractors, who claimed some \$50,000 for extra work on this company's new wharf at New London, the matter was referred to arbitrators by mutual consent, and they have decided that there is \$10,500 due to the contractors.

New Albany & Northeastern.

A new organization has bought an old road-bed, graded several years ago, and purposes building a railroad from New Albany, Ind., northeast to Charlestown, about 18 miles. It is proposed also to continue the road up the Ohio River to Hanover and Vevay, connecting eventually for Pittsburgh. It is to be a narrow-gauge road.

Boston & Albany.

This company is now buying its stock of ties for the year, which are usually bought at this season in small lots from farmers and others along the line. About 170,000 are to be bought this year. Only chestnut ties are taken and the price ranges from 30 to 50 cents each, according to size and quality. The company is buying very little wood this year, as the wood-burning engines, a few of which are left on the western end of the line, are all to be changed to coal-burners.

Illinois & Michigan Canal.

The Illinois & Michigan Canal (Chicago to La Salle, Ill.) during the last season earned \$117,696.57, while its expenses were \$93,873.13. Tolls were a third lower and tonnage about one-half more than in 1875. There are now 22 steam canal boats running with success on the canal and the Illinois River.

Painesville, Canton & Bridgeport.

This company has concluded a contract with Weiss, Britton & Co., of Shadyside, Pa., for the construction of a narrow-gauge railroad from Chagrin Falls, O., southward to the Pittsburgh, Fort Wayne & Chicago road near Canton, about 50 miles, the road to be completed this year. As soon as further arrangements can be made the same contractors will begin work on an extension from Chagrin Falls northwest to Cleveland, and from Canton south by east to Bridgeport on the Ohio

River. The whole length of the road from Cleveland to Bridgeport will be about 140 miles. Work on the first section will be begun as soon as the weather will permit. Messrs. Weiss, Britton & Co. are experienced contractors, and have lately completed the extension of the Parker & Kars City road to Butler.

Boston, Clinton, Fitchburg & New Bedford.

At a meeting of the directors in Fitchburg, Mass., Jan. 16, the resignation of Mr. H. A. Blood as Manager was accepted, to take effect Feb. 1. The board referred the subject of petitioning the Legislature for authority to issue \$2,000,000 preferred stock, to fund the floating debt, to the Executive Committee with power to act.

Portland & Ogdensburg.

At the annual meeting in Portland, Me., Jan. 16, the usual reports were received and read, but all other business was postponed to an adjourned meeting to be held Feb. 13.

Atlantic & Gulf.

Notice is given that the following Junction Branch bonds have been drawn by lot for redemption, according to the terms of the mortgage, and will be paid on presentation to the Savannah Bank & Trust Company: Nos. 39, 58, 80, 83 and 87 for \$500 each, Nos. 3, 28, 36, 39 and 41 for \$100 each.

The company has had outstanding for a long time what are known as fare notes or change bills, which are for small amounts and have entered largely into the currency of Savannah and other towns along the line. The entire amount of these outstanding by the last report was \$80,000. The company's default on its January coupons caused a sort of panic among the holders of these bills, and many persons refused to receive them, or took them only at a discount. To stop this the company has announced that they will be destroyed as fast as received in payment for fares and freights, instead of being paid out again, and already some \$57,000 of them have been canceled and burned, and they will soon be practically out of circulation.

A movement has been begun to have receivers appointed. It is said to be in the interest of stockholders and floating debt creditors, and a counter-application may be made by the bondholders.

ANNUAL REPORTS.

Connecticut River.

This company owns a line 50 miles long, from Springfield, Mass., northward through the Connecticut Valley to South Vernon, with branches from Chicopee Junction to Chicopee Falls, 2.35 miles, and from Mt. Tom to Easthampton, 3.50 miles. Besides serving a thickly settled farming and manufacturing district, its line is a connecting link between the Vermont system of roads and the Southern line to New Haven and New York. The thirty-second annual report covers the year ending Sept. 30, 1876. The equipment consists of 19 locomotives, 25 passenger and 13 baggage cars, and 326 freight cars.

The property is represented as follows in the capital account:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passenger-train mileage.....	106,837	92,220	Inc. . 16,617	18.0
Freight " "	155,294	183,492	Dec. . 28,196	15.3
Other " "	5,608	12,114	Dec. . 6,506	55.8

Total..... 269,739 287,766 Dec. . 18,027 6.3

Cars peaches carried..... 2,117 9,072 Dec. . 6,955 76.4

" other fruit..... 882 905 Dec. . 23 2.5

income has continued to decline from the large figures of 1873. The expenses have also been reduced and the accounts indicate a healthy financial condition. The road is enjoying the benefits of former liberal expenditures for steel rails, of which there are now some 47 miles in a total of 71 miles of track. About 450 tons of steel rail have been added during the year and cross ties to the number of 26,000 have been renewed, placing our track in such order as to compare favorably with the tracks of other roads.

" The equipment of the road has not been allowed to deteriorate, although there has been somewhat less than the usual expenditure for renewals of cars and engines.

" The station grounds at Northampton have been enlarged and improved by the purchase of adjoining lands to the amount of some \$10,000, which was carried to the construction account."

Delaware.

This company owns a line from Delaware Junction, Del., southward to Delmar, 83 miles, with branches from Smyrna Junction to Smyrna, 1½ miles; Townsend to Massey's 9 miles, and from Seaford to the Maryland line, 6 miles. The Townsend Branch is leased to the Queen Anne's & Kent, and the Seaford Branch to the Dorchester & Delaware Company. The line owned is 99½ miles; worked 84½ miles, the latter being worked by the Philadelphia, Wilmington & Baltimore Company for 70 per cent. of the receipts. The report is for the year ending Oct. 31, 1876.

During the year the Delaware State loan of \$170,000, with \$5,100 interest, was paid from the sinking fund. Deducting these payments and adding the accumulation of the year the fund amounted at its close to \$26,496.15.

The train mileage and the fruit traffic for the year were as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passenger-train mileage.....	\$157,79 82	\$145,967 86	Inc. . \$11,761 97	8.1
Freights.....	220,618 18	349,094 06	Dec. . 128,475 88	36.8
Other.....	18,730 87	15,032 21	Dec. . 1,301 34	8.7

Total..... 269,739 287,766 Dec. . 18,027 6.3

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Passengers.....	\$157,79 82	\$145,967 86	Inc. . \$11,761 97	8.1
Freights.....	220,618 18	349,094 06	Dec. . 128,475 88	36.8
Mail and Miscellaneous.....	18,730 87	15,032 21	Dec. . 1,301 34	8.7

Total..... 269,739 287,766 Dec. . 18,027 6.3

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Paid leasee 70 per cent. for operating.....	274,455 21	357,065 88	Dec. . 82,610 67	23.1
Net earnings.....	\$117,623 66	\$153,028 24	Dec. . \$35,404 58	23.1
Interest and dividends less rent of branches.....	187,163 66	129,221 38	Dec. . 7,932 28	6.1

Deficit or surplus..... \$19,530 00 \$23,806 86

Gross earnings per mile..... 4,653 79 6,054 53 Dec. . \$1,490 74 23.1

The decrease in earnings was chiefly due to the great falling off in the peach traffic. The lessee has maintained the road in excellent condition and has worked it efficiently. During the year new stations were built at Mt. Pleasant and Harrington; new station, coal shed and yard at Smyrna; new sidings at Seaford, Delmar and other places; the bridge over Broad Creek repaired and altered and many smaller improvements made.

The lease to the Philadelphia, Wilmington & Baltimore has been renewed, that company agreeing, instead of 70 per cent. of the earnings, to pay all interest and 6 per cent. dividends, a deficiency in any year to be a charge on the future earnings of the leased road.

Train Accidents in December.

On the afternoon of the 1st the rear car of an express train on the Boston & Providence road was thrown from the track and somewhat damaged, near Hebronville, Mass., by the breaking of the forward truck.

On the evening of the 1st the engine of a train on the Seaboard & Roanoke road ran off the track in Portsmouth, Va.

On the night of the 1st a freight train on the New Haven & Hartford road broke in two near Portchester, N. Y., and the rear section afterwards ran into the forward one, wrecking four cars and blocking the road several hours.

On the morning of the 2d the engine and four cars of a passenger train on the Long Island Railroad were thrown from the track by a misplaced switch at Fresh Pond, N. Y.

On the 2d a freight train on the Illinois Midland road ran off the track near Morton, Ill., blocking the road several hours.

On the night of the 2d a heavy freight train, drawn by two engines, ran off the track near Glade Spring, Va., on the Atlantic, Mississippi & Ohio road. Both engines and several cars were wrecked, and the conductor hurt.

Early on the morning of the 5th there was a butting collision between a freight and a coal train on the Lake Shore & Michigan Southern road, in Buffalo, N. Y., by which both engines were damaged and several cars badly broken.

On the morning of the 5th a freight train on the Baltimore & Ohio road ran into a preceding freight near Grafton, W. Va., wrecking three cars.

On the morning of the 5th a passenger train on the Nashville, Chattanooga & St. Louis road struck a broken rail near Waverley, Tenn., and the rear car was thrown from the track and upset down a bank. Eight passengers were hurt.

On the morning of the 5th the engine and baggage car of a train on the Nashville & Decatur road were thrown from the track by a broken rail at McDonald, Tenn., and both were badly broken. The engineer and fireman were hurt.

On the morning of the 7th a passenger train on the Ohio & Mississippi road was thrown from the track near Georigia, Ind., by the breaking of an axle under the engine.

On the morning of the 7th a passenger train on the New York, New Haven & Hartford road ran over a misplaced switch and into an engine which was just coming out of the roundhouse at Stamford, Conn., both engines being somewhat damaged.

On the morning of the 7th a car of a freight train on the Pennsylvania Railroad ran off the track at Allegheny, Pa., delaying trains a short time.

On the morning of the 8th a freight train on the Peoria Branch of the Chicago, Rock Island & Pacific ran into some cars which had broken loose from a preceding mixed train, damaging the engine and wrecking two cars. A signal had been sent back, but it was snowing hard and the freight could not be stopped in time.

On the 8th the two rear cars of a passenger train on the Jacksonville, Pensacola & Mobile road were thrown from the track by the spreading of the rails near Baldwin, Fla. One of them upset and was badly broken, injuring four passengers.

On the evening of the 8th, at the Union depot in Indianapolis, a Cincinnati, Hamilton & Dayton engine ran into some freight cars which had broken loose from a freight train which was switching in the yard. The engine was damaged and several cars broken up.

The income account is summed up as follows:

Net earnings..... \$207,267 42

Accretion to the sinking fund..... 10,513 46

Total..... \$217,780 88

Interest paid..... \$29,411 77

Loss to sinking fund, and expenses of same..... 15,221 05

Dividends, 8 per cent..... 168,000 00

215,632 82

On the morning of the 9th, in a heavy snow storm, a passenger train on the Erie Railway ran off the track at a switch at Dale, N. Y.

A few minutes later a freight train ran into the rear of the passenger, throwing the two rear cars from the track and breaking them badly. The wreck caught fire and the whole train of four cars, baggage, smoking, passenger and sleeping cars, was burned. A passenger who had escaped from the sleeper, but returned to get his baggage, was burned to death.

On the afternoon of the 9th a freight train on the New York Central & Hudson River ran into the rear of a preceding freight which had become stalled in a snow-bank near Kirkville, N. Y., wrecking several cars. The stalled train had sent back a signal, but the tracks were slippery and the train could not be stopped in time. The road was blocked six hours.

Late on the night of the 9th the engine and seven cars of a freight train on the Atlantic & Great Western road were thrown from the track in a deep snow-bank near Genesee, N. Y.

Very early on the morning of the 10th, a passenger train on the New York Central & Hudson River ran into the rear of a freight train, which was stalled in a snow-bank near Wende, N. Y. Both engines on the passenger train (which was drawn by two) and several cars were badly wrecked and the wreck partly destroyed by fire. An express messenger was burned to death, and an engineman and fireman badly hurt. It is said that the conductor of the freight sent back a brakeman with a signal, but the man took shelter from the storm and allowed the express to pass him. Testimony at the coroner's inquest showed that the man had had hardly any rest for several days, and was worn out.

On the 10th a train on the International & Great Northern road ran off the track near Troup, Tex., and two trainmen were badly hurt.

On the 10th a freight train on the Savannah & Charleston road ran off the track near Yemassee, S. C., blocking the road some hours.

On the morning of the 11th, at Short's, Ohio, there was a butting collision between a freight and a mixed train on the Indianapolis, Cincinnati & Lafayette road, by which both engines and several cars were damaged and three persons hurt.

On the morning of the 11th, the engine of a local passenger train on the Pennsylvania Railroad blew out a cylinder head at South Elizabeth, N. J., delaying the train an hour.

On the 13th, some cars of a freight train on the Chicago, Rock Island & Pacific road were thrown from the track near Perlee, Ia.

On the morning of the 14th, two cars of a freight train on the Erie Railway ran off the track at the western end of the Bergen Tunnel, delaying trains an hour.

On the night of the 14th, the caboose car of a mixed train on the St. Louis, Keokuk & Northwestern road caught fire from the stove when the car was near Alexandria, Mo., and was destroyed. A workman was badly burned while trying to put out the fire.

On the 15th, a special train on the Cincinnati, Lafayette & Chicago road, consisting of an engine and one passenger car, was thrown from the track near Lafayette, Ind., by the breaking of a driving-wheel under the engine. The car rolled over down a high bank and was completely wrecked, injuring all the passengers, 10 in number.

On the 15th, on the Mobile & Ohio road, near Lockhart, Miss., there was a butting collision between a north-bound mail and a south-bound freight train, by which one engine was badly damaged and a brakeman killed. The freight train was running on the mail's time.

On the 15th, a freight train on the Pennsylvania Railroad ran into the rear of a ballast train at the Fish House, near East Newark, N. J., damaging several cars and injuring two trainmen.

On the morning of the 16th, at Carroll Switch, near Baltimore, on the Baltimore & Ohio, a freight train from Mount Clare station struck the engine of a passenger train going towards Camden station. Both engines were badly broken and a baggage car damaged. It is stated that the usual crossing signal was displayed, but the freight train could not be stopped in time. One engineman and a fireman were hurt.

On the morning of the 16th a passenger train on the Intercolonial Railway struck an engine which was just coming out of the round-house in St. John, N. B., damaging both engines and several cars. The road was blocked all day.

On the morning of the 16th a ballast train on the Philadelphia & Reading road was thrown from the track near Mt. Carroll, Pa., by a misplaced switch, and several cars went into the canal. A brakeman was badly hurt.

On the 16th a freight train on the Boston, Concord & Montreal road ran into a freight car which had been blown out of a siding upon the main track at Whitfield, N. H., during a heavy storm. The engine and car were badly damaged.

On the 17th there was a butting collision between a north-bound and a south-bound freight train, near Malvern, Ark., on the St. Louis, Iron Mountain & Southern road, both engines being wrecked.

On the morning of the 18th the engine and two cars of a freight train on the Erie Railway ran off the track in Paterston, N. J., blocking the west-bound track several hours.

On the 18th two cars of a freight train on the Erie Railway were thrown from the track near Great Valley, N. Y., by the breaking of an axle.

Very early on the morning of the 19th ten cars of a freight train on the Chicago, Rock Island & Pacific road were thrown from the track at Peru, Ill., by a broken frog. The cars were badly damaged and the road blocked nine hours.

On the 19th a freight train on the Nashville, Chattanooga & St. Louis road struck a hand car loaded with rails which was standing on the track near Nashville, Tenn. The engine and several cars were thrown from the track and the engine was badly damaged, a rail going through the boiler.

On the evening of the 19th, near Fox Station, Ill., on the Fox River Branch of the Chicago, Burlington & Quincy road, a passenger train was thrown from the track by a broken rail and delayed about an hour and a half.

Late on the night of the 19th an express train on the Great Western Railway was thrown from the track near Dorchester, Ont., by the breaking of a wheel under the baggage car. The whole train left the track and the baggage car upset and was badly broken. The wreck caught fire, but was quickly put out with snow. Five persons were hurt.

Early on the morning of the 20th an express car of the newspaper train on the Pennsylvania Railroad ran off the track in the yard at Jersey City, N. J., delaying the train an hour.

On the 20th a freight car of a transfer train on the Illinois & St. Louis Bridge ran off the track near the east end of the bridge, in East St. Louis, Ill. Five cars following were piled up on it and badly broken.

On the 20th six cars of a freight train on the Harlem Extension road ran off the track near Manchester, Vt., and were somewhat damaged.

On the 20th an express train on the Missouri, Kansas & Texas road struck a broken rail near Stringtown, Indian Ter., and two cars were thrown into the ditch and badly broken, injuring 10 passengers.

On the afternoon of the 20th a north-bound train on the New York Elevated Railroad ran over a misplaced switch on the Vandam street turnout in N-W York and into a south-bound train, damaging an engine and a car and injuring a fireman seriously.

On the afternoon of the 20th, near Princeton, Mass., on the Boston, Barre & Gardner road, there was a butting collision

between a north-bound passenger and a south-bound mixed train by which both engines and several cars were badly damaged, an engineman, a brakeman and a passenger fatally hurt, a conductor and baggageman less seriously injured. The north-bound train is said to have had the right to the track.

On the evening of the 20th the engine and three cars of a passenger train on the Pennsylvania Railroad ran off the track in Altoona, Pa.

On the night of the 20th a coal train on the Belvidere Division of the Pennsylvania Railroad ran into the rear of a freight train which was standing on the track at Andover Furnace, N. J., wrecking several cars, killing a brakeman, injuring another brakeman and a conductor. It is said that the freight had no signal back.

Early on the morning of the 21st an express train on the Kansas Pacific road went through a bridge near Hayes City, Kan., and the engine and three cars were wrecked and the wreck burned up. The express messenger was killed and a mail clerk hurt.

On the evening of the 21st the engine and one car of a train on the Raleigh & Augusta Air Line were thrown from the track at Sanford, N. C., by a misplaced switch.

On the morning of the 22d a car in a freight train on the Little Miami Division of the Pittsburgh, Cincinnati & St. Louis road caught fire when the train was near Columbus, O. The car was loaded with oil and was entirely destroyed.

On the 22d the engine of a train on the Ohio & Toledo road ran off the track at Onesida, O., blocking the track all day.

On the 22d, on the Grand Trunk Railway at St. Lambert, P. Q., there was a butting collision between two passenger trains, by which both engines were damaged.

On the afternoon of the 22d two cars of an accommodation train on the Philadelphia & Reading road were thrown from the track by a broken switch rod at Locust Gap, Pa., and one of them upset and was badly damaged.

On the evening of the 22d a mixed train on the Old Colony road broke in two near Newport, R. I., and the rear section afterward ran into the forward one, wrecking several cars, one of which caught fire and was destroyed.

Very early on the morning of the 23d, as a freight train on the St. Louis & Southwestern road was passing over a bridge at Drivers', near Mt. Vernon, Ill., the bridge gave way and eight cars went down and were wrecked. The wreck caught fire and two cars were burned up. A brakeman was hurt.

On the afternoon of the 23d the boiler of an engine on the Illinois Midland road exploded while the train was standing on a siding at Paris, Ill., destroying the engine, killing the engineman, fireman and a brakeman. The cause of the explosion is not known, though it is reported that the boiler was old and the safety-valve loaded down.

On the night of the 23d a freight train on the Houston & Texas Central road ran into the rear of a mixed train which had stopped to take water at Howe, Tex., wrecking two cars, killing a tramp who was stealing a ride, injuring two trainmen and three passengers.

Very late on the night of the 23d a passenger train on the Cleveland & Pittsburgh road was thrown from the track by a misplaced switch at Adams street station in Cleveland, O., and the baggage car was badly broken.

Near midnight on the 23d a passenger train on the Pittsburgh, Fort Wayne & Chicago road was thrown from the track by a misplaced switch near Fort Wayne, Ind. A frightened passenger, who tried to jump off, was caught between two cars and killed.

On the afternoon of the 24th a mile train on the Erie Railway ran into the head of an engine which was coming into the yard at Port Jervis, N. Y., and both engines were damaged.

On the afternoon of the 24th the engine and three cars of an express train on the Hannibal & St. Joseph road were thrown from the track near St. Joseph, Mo., by a broken rail, and the cars upset.

On the morning of the 25th a freight train on the New York Central & Hudson River road ran into the rear of a preceding freight near Utica, N. Y., damaging several cars. There was quite a fog at the time.

On the morning of the 25th a passenger train on the Cleveland, Columbus, Cincinnati & Indianapolis road was thrown from the track by a broken rail near Bellfontaine, O., and one car upset, injuring eight passengers.

On the 25th a construction train on the Galveston, Harrisburg & San Antonio road broke in two near Marion, Tex., and the rear half afterwards ran into the forward one, wrecking two cars, killing one train-man, injuring another and two tramps who were stealing a ride.

On the afternoon of the 25th an express train on the New York Central & Hudson River road was thrown from the track in Little Falls, N. Y., by the breaking of a truck wheel under the engine. The entire train left the track and one car was badly damaged.

On the night of the 25th, the parallel rod of an engine on the Indianapolis, Cincinnati & Lafayette road broke when the train was near Guilford, Ind., and the loose ends broke up the cab and injured the engineman badly.

Late on the night of the 25th part of an express train on the Atlantic, Mississippi & Ohio road was thrown from the track near Bellevue, Va., by some obstructions put on the rails, evidently for the purpose of wrecking the train.

On the night of the 26th, as some freight cars were being taken down the incline to the transfer ferry at Evansville, Ind., on the St. Louis & Southwestern road, two of them broke loose, ran across the ferry-boat, breaking the stopping post, and jumped into the Ohio River.

On the evening of the 27th three cars of a freight train on the Erie Railway were thrown from the track by a broken rail at Middletown, N. Y., blocking both tracks for two hours.

On the 28th an express train on the Chicago & Iowa road was thrown from the track and wrecked by a broken rail near Shabbons, Ill.

On the 28th, an axle broke under a freight car in a train on the Quincy, Missouri & Pacific road, as it was passing over a bridge near Edina, Mo. Three cars left the track, went off the bridge into the creek and were wrecked; the bridge was also badly damaged.

On the 28th a passenger train on the Erie Railway ran over a misplaced switch at Gainesville, N. Y., and into the head of a freight which was standing on a siding, doing some damage.

On the 28th a freight train on the Cairo & St. Louis road broke through a trestle near Roseborough, Ill., and some cars were damaged.

On the 28th there was a collision between two trains on the St. Louis & Southeastern road near Earlington, Ky., by which one passenger was hurt.

On the afternoon of the 28th two cars of an express train on the Chicago & Iowa road were thrown from the track by a broken rail near Shabbons, Ill., blocking the road two hours.

On the evening of the 28th, at Jacksonville, Ill., on the Toledo, Wabash & Western Railway, as a passenger train was going on the siding, the engine ran off an open switch into a culvert, delaying the train three hours.

On the morning of the 29th three cars of a passenger train on the Marietta & Cincinnati road ran off the track in Cincinnati, causing a short delay.

On the 29th the two rear cars of a freight train on the Louisville, New Albany & Chicago road was thrown from the track by a broken rail near Bainbridge, Ind., and wrecked. A driver of the caboose was badly hurt.

On the evening of the 29th, about 8 o'clock, an express train on the Lake Shore & Michigan Southern road broke through a bridge over Ashtabula Creek, at Ashtabula, O., and fell some 70 feet into the creek below. The train, which was running

slowly at the time, the track being obstructed by snow, consisted of two engines and 11 cars—a baggage, a mail and an express car, five passenger and three sleeping coaches. The first engine broke loose and reached the western end of the bridge, but all the rest of the train went down, the cars breaking through the ice of the shallow creek and being, of course, badly broken up. Before anything could be done to rescue passengers from the wreck it caught fire in several places and the flames spread so rapidly that many were burned to death. The number of killed cannot be definitely ascertained, but what seems to be the most correct estimate there were 128 passengers and 19 employees on the train, of whom 75 are missing; 67 were saved in an injured condition, five of whom have since died, and five only escaped unhurt. The bridge which gave way was an iron Howe truss of 150 feet span, built at Cleveland 11 years ago. It had been recently inspected and was believed to be in good order. The theory has been advanced that part of the train ran off the track just before reaching or while on the bridge, and that the resulting jar was the occasion, if not the cause, of the giving way, but the facts as known hardly seem to substantiate this, and it would not account for the breakage of a good bridge. There has been a great deal of discussion as to the merits of the bridge, which was almost the only one of its kind in existence. Two investigations are in progress into the accident, which have not yet revealed much that is new.

On the night of the 29th an express train on the Rutland Railroad broke through a wooden bridge at Pittsford, Vt., and the whole train, an engine, baggage car, passenger car and sleeping car fell 15 feet upon the frozen creek below, the cars being badly broken. Only one passenger was slightly hurt, though several were scratched and bruised. The train is believed to have left the track before the bridge fell. By a singular coincidence the sleeping car left New York and ran to Albany in the same train with the sleeping cars which went through the bridge at Ashtabula on the Lake Shore road.

On the morning of the 30th a passenger train on the Vandals Line ran into the rear of a coal train which was standing on the track at Bartlett's Mine, Ill., wrecking several coal cars, injuring a brakeman and blocking the road two hours.

On the night of the 30th a passenger train on the Rutland Railroad was thrown from the track by a misplaced switch in Rutland, Vt., blocking the road two hours.

On the morning of the 31st the rear car of an express train on the New York Central & Hudson River road was thrown from the track and upset near Buffalo, N. Y.

On the afternoon of the 31st a freight train on the Utica Division of the Delaware, Lackawanna & Western ran off the track in a snow-bank near Clayville, N. Y., blocking the road an hour.

This is a total of 88 accidents, whereby 94 persons were killed and 141 injured. Eleven accidents caused the death of one or more persons, 21 caused injury less than death, while 66, or 63.6 per cent. of the whole caused no injury serious enough for record.

These accidents may be classified as to their nature and causes as follows:

COLLISIONS:	
Rear collisions	16
Butting collisions	11
Crossing collisions	1
Unexplained	1
	— 29

DERAILMENTS:	
Unexplained	16
Broken rail	10
Misplaced switch	7
Broken bridge	5
Broken axle	3
Broken wheel	3
Snow or ice	3
Broken truck	1
Broken frog	1
Broken switch rod	1
Broken coupling	1
Spreading of rails	1
Accidental obstruction	1
Malicious obstruction	1
	— 54

CARS BURNED WHILE RUNNING:	
Burned while running	2
Boiler explosion	1
Cylinder head blown out	1
Broken connecting rod	1
	— 1

Total 2

Four collisions were caused by trains breaking in two; four by want of or neglect to use signals; three by misplaced switches; two by misunderstanding or disobedience of orders, and one each by snow, by fog, and by cars blown out of siding. There were 31 accidents caused directly by defect or failure of road or equipment. Of the five broken bridges one was a wooden trestle, three others wooden truss bridges and the fifth was the iron Howe truss which fell at Ashtabula, and the cause of whose failure cannot be said to be known as yet, in spite of the two investigations in progress.

As compared with December, 1875, there is an increase of four accidents, of 82 in the number killed and of 79 in that injured.

The last half of the month was one of severe weather, especially in the Middle and Eastern States, with many storms and heavy snow. As might be expected, there were many broken rails and several failures of wheels and axles. Three accidents are traced directly to snow and several of the unexplained derailments and collisions are doubtless due to the same cause. Collisions still form a large proportion of the number of accidents, about one-third, and there is evidently on many roads not care enough in the use of signals by trainmen. The number of killed and injured is swelled to great proportions by the casualties at Ashtabula, the accident there being the most terribly destructive of human life on record.

For the year ending with December the record is as follows:

	No. of accidents.	Killed.	Injured
January	60	8	39
February	91	15	68
March	109	30	56
April	56	6	4
May	64	13	



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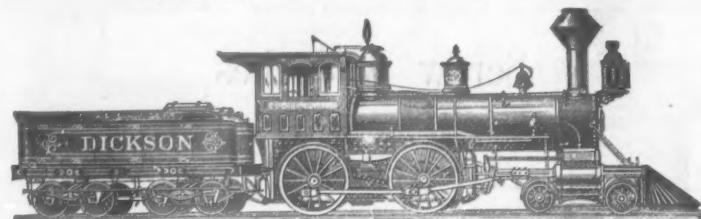
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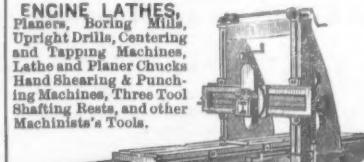
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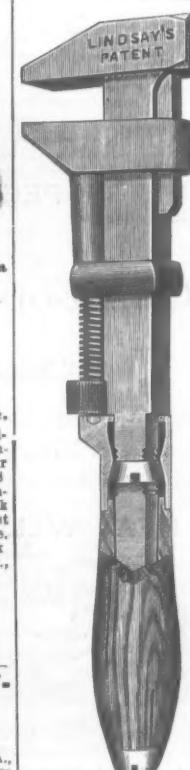
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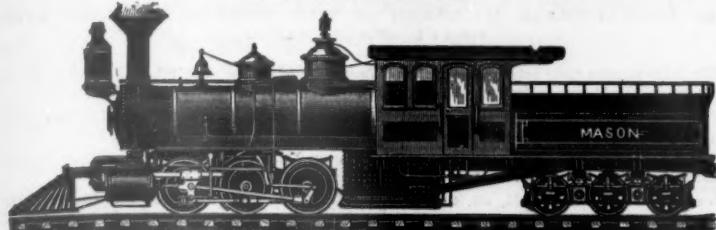
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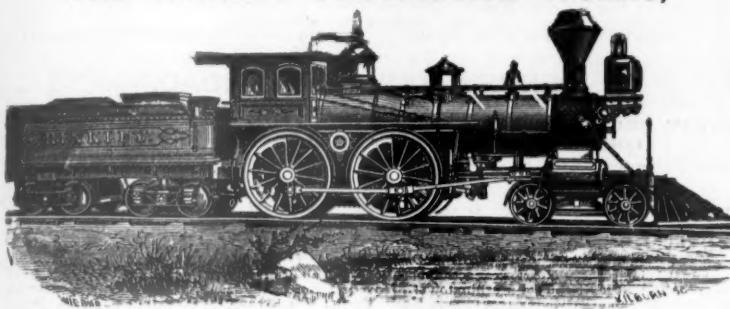
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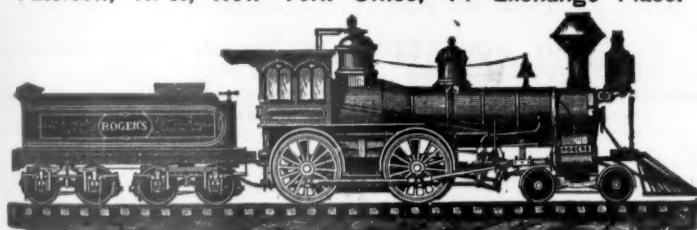
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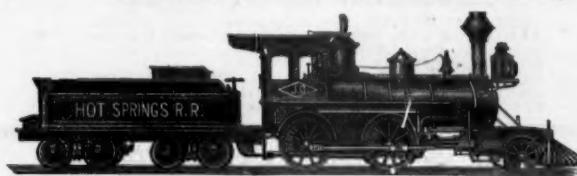
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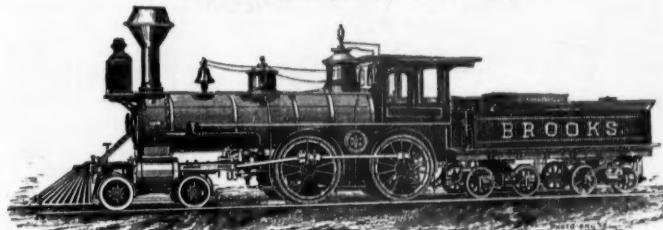
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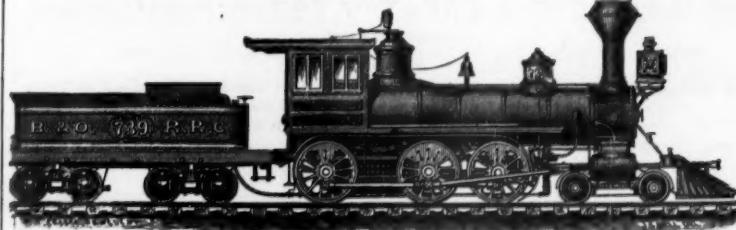
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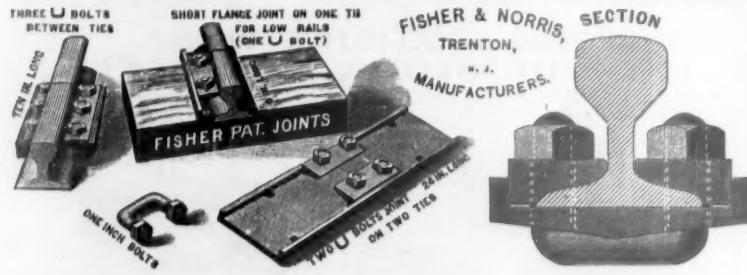
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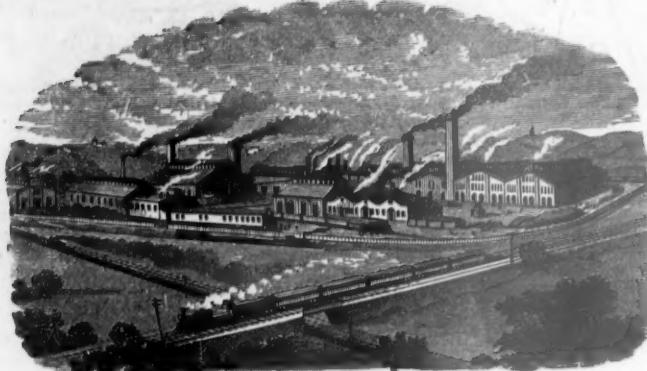
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10 H. P., \$15.	26 H. P., \$25.	45 H. P., \$35.	70 H. P., \$45.	100 H. P., \$55.	140 H. P., \$65.	190 H. P., \$75.	275 H. P., \$95.

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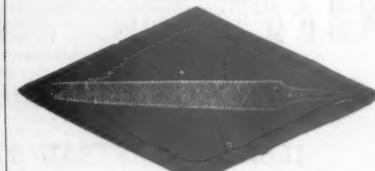
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see "Mining and Commercial
Lamp," see Van Nostrand's Engi-
neering Magazine, June, 1873.

Extract from report of Committee of Civ. Engrs. appointed by Frank-

lin Inst. to examine H. & B.'s new

Transit (Dec. 1871); it exhibits

several novelties of construction in

which, in the opinion of the committee, render it super-

ior to those now in use, and in its opinion the deviations

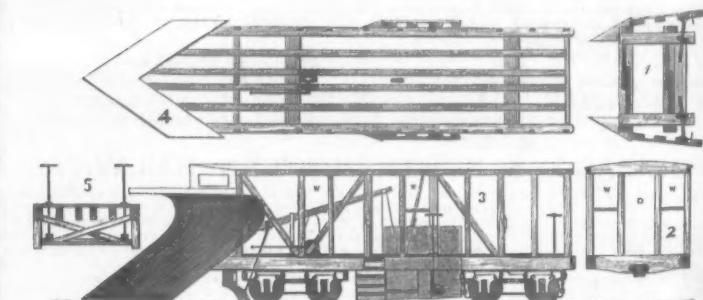
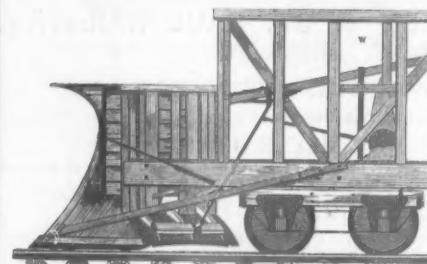
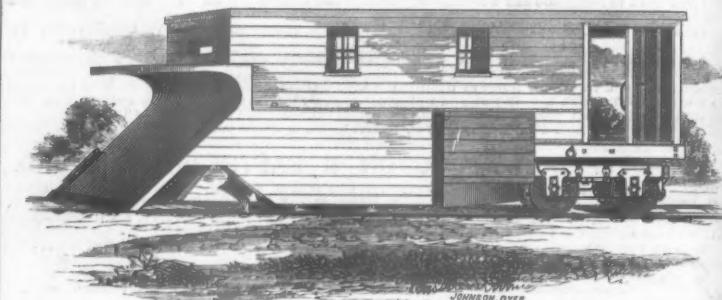
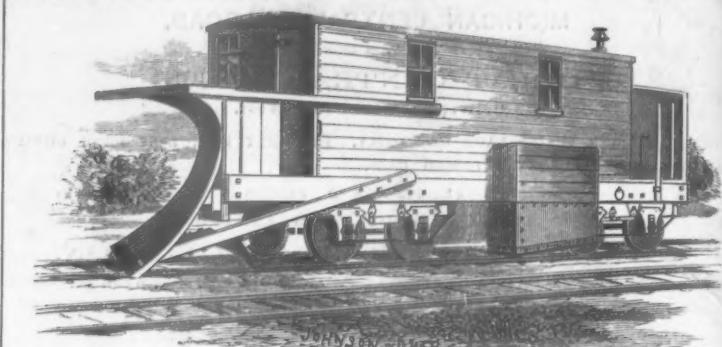
which they have made from the common styles of Transit

are decided improvements."

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Application.

HEYWOOD'S PATENT SNOW PLOW.



1. Application of Wings. 2. Tool House. 3. Caboose. 4. Application of Plow to Car. 5. Brake for Extending Wings.

TESTIMONIALS.

BOSTON, CLINTON & FITCHBURG RAILROAD,
SUPERINTENDENT'S OFFICE,
FITCHBURG, Mass., March 10, 1873.

C. L. HEYWOOD, Esq.:
Dear Sir—I think C. L. Heywood's Combination
Snow Plow and Flange Clearer which we have in use
on the Framingham & Lowell Railroad the best
of anything now in use for the purpose of clearing
snow and ice from the track.

Respectfully yours, H. A. BLOOD, Sup't.

INDIANAPOLIS & CINCINNATI RAILROAD,
MASTER MECHANICS' OFFICE,
CINCINNATI, Ohio, Nov. 28, 1865.

Mr. C. L. HEYWOOD, Boston, Mass.:
Your letter, requesting me to give an opinion
relative to the merits of your Snow Plow and
Scrapers, is received. It affords me pleasure to say
that while engaged on the Fitchburg Railroad I
had an opportunity to examine it carefully, and
witness its operation. It is the best machine I have
ever seen, not only for clearing snow and ice from
the track, but at the same time removing it deep
enough so that the flanges suffer no impediment
whatever. The great speed at which it can be run
with perfect safety gives it an advantage over any
other machine now used for that purpose. Its
simplicity and durability render it a desirable
machine for any railroad obstructed by snow or
ice.

Yours truly, H. M. BRITTON, Master Mechanic.

The undersigned fully concur in the above state-
ments. H. W. BULLENS,
Master Mechanic Fitchburg Railroad.

L. J. SPAULDING,
Road Master Fitchburg Railroad.

APPLY TO C. L. HEYWOOD, Boston, Mass.; or to

PORLTAND LOCOMOTIVE WORKS, Portland, Me.
WASON CAR WORKS, Springfield, Mass.

FLINT & PERE MARQUETTE RAILWAY,
OFFICE MASTER MECHANIC,
EAST SAGINAW, Mich., Jan. 16, 1873.

C. L. HEYWOOD, Boston, Mass.:
Dear Sir—in regard to the Snow Plow, I can say
it is the most perfect one I ever saw. We have just
had one of the most severe snow storms ever ex-
perienced in this country, and if we had not had your
Plow we should have been entirely blocked in until
we could have shoveled it out. The snow was
heavy, like sand; in fact it was nothing but sand,
and with one locomotive attached to the Plow, we
cleared the road with perfect ease—in fact, we think
so much of it that we have another nearly com-
plete, with the exception of the side wings, which
we did not think necessary to have on both.

Hoping your Plow will meet with the success it
deserves, I remain, Yours truly,

SANFORD KEELER, Master Mechanic.

VERMONT & MASSACHUSETTS AND
TROY & GREENFIELD RAILROADS,
SUPERINTENDENT'S OFFICE,
FITCHBURG, Mass., June 13, 1873.

C. L. HEYWOOD, Esq.:
Dear Sir—in answer to your inquiry, all I can say
is that your Snow Plow gives perfect satisfaction.
You well know that for the nineteen years that I
have been Superintendent of this road of storms
and snows, that I have not been slow to adopt any
improvement that would relieve us during the
snowy season; but with all my efforts I never was
contented until I adopted your Plow. Now let
snow come—I am ready.

Yours truly, OTIS T. RUGGLES, Sup't.

ESTABLISHED 1820.

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Engineering Instrument Makers,

43 NORTH SEVENTH STREET,

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Tapes, Chains, Draughting Instru-
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